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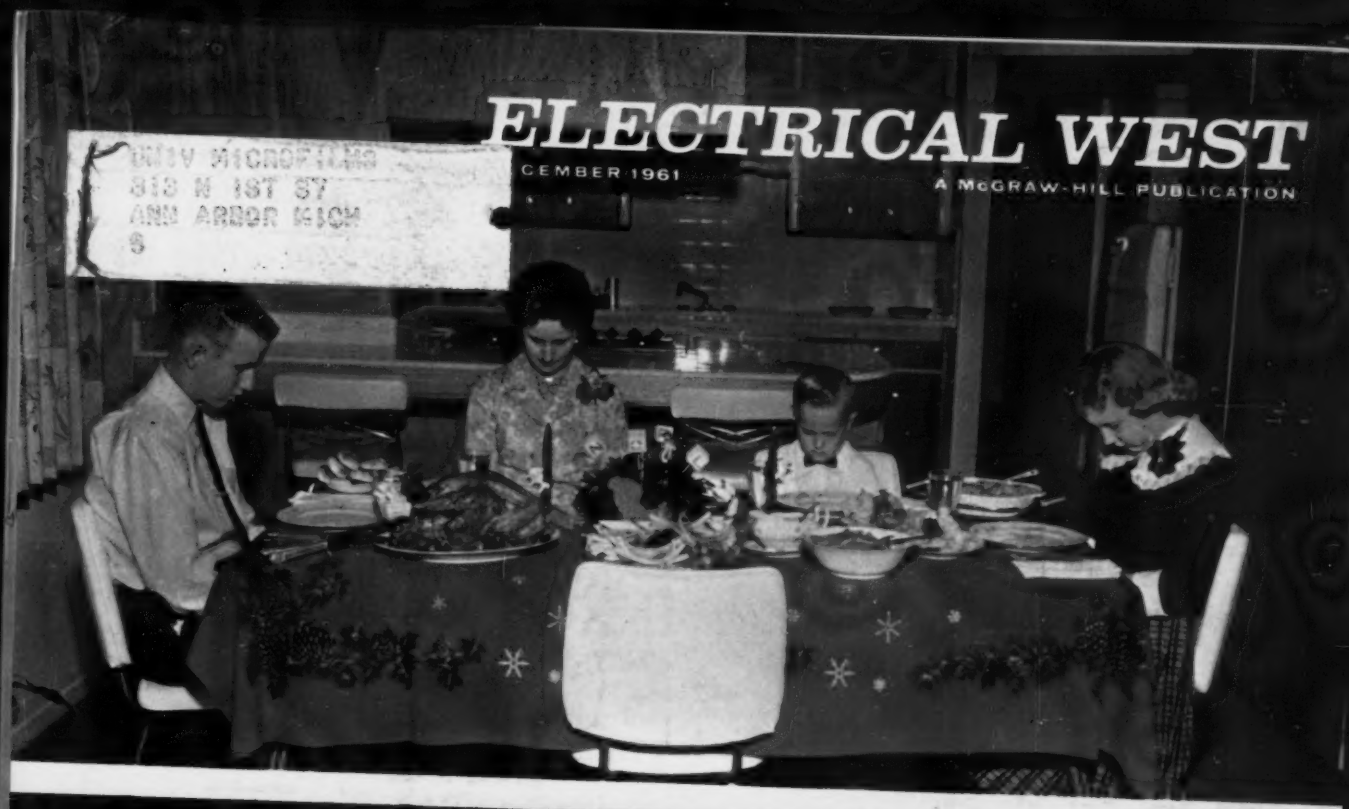
ELECTRICAL WEST

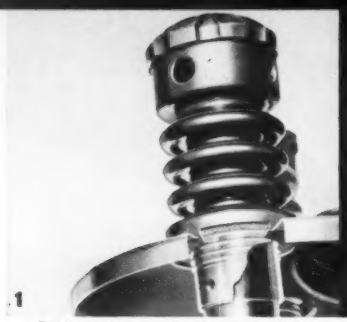
CEMBER 1961

A McGRAW-HILL PUBLICATION



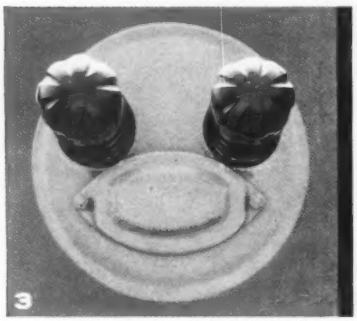
50 CENTS

12 Reasons Why You Get extra value in Kuhlman Transformers



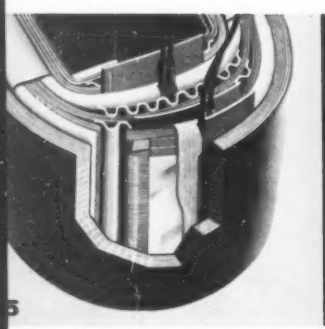
1 Oil-less radio noise free bushings with internal clamping sleeve.

2 "Quick-Grip" insulated hand connectors.

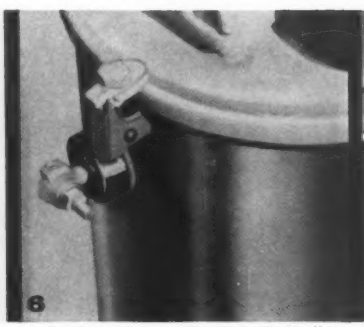


3 Bird and animal-proof "Celuclad" covers.

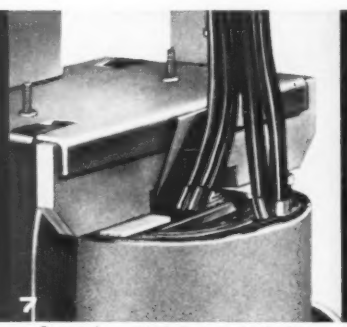
4 Spring-pressure low voltage connectors for copper and aluminum conductors.



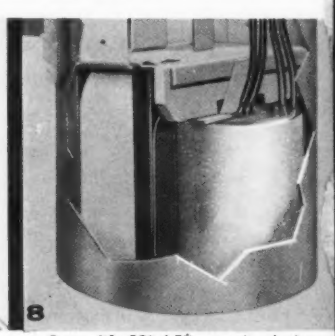
5 Special insulated and shielded primary windings with greater ability to withstand lightning and switching surges.



6 Brighter, longer lasting "Lucite" finish.

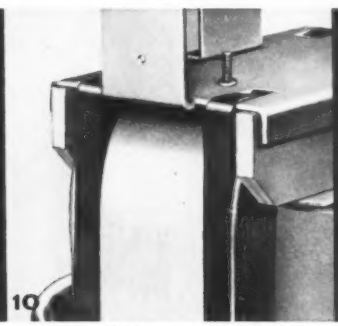


7 Special coated layer insulation resulting in improved short-circuit capability.

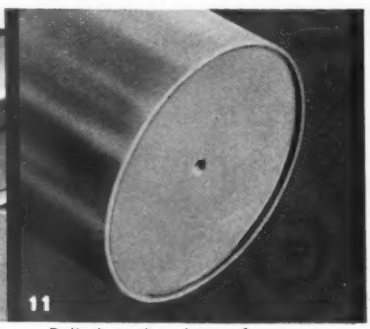


8 Bonus life SPI-65* super insulation.

9 Gleaming white interiors that let you see right to the bottom of the tank.



10 Low-loss Kuhlman core with better performance guarantees.



11 Rolled under base for easy handling.

12 Lighter, smaller designs that are more economical to operate and maintain.

ONLY KUHLMAN GIVES YOU ALL THESE EXTRA-VALUE FEATURES

Call your Kuhlman representative today. He will gladly show you all the extra value and savings you get with Kuhlman transformers.

KUHLMAN TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Michigan
Manufacturers of transformers since 1894
Western Division—Salinas, California

*Licensed under Westinghouse Insuldur® patent rights.

And a Happy New Year?

The average age of the world's great civilizations has been 200 years. These nations progressed through this sequence:

From Bondage to Spiritual Faith

From Spiritual Faith to Great Courage

From Courage to Liberty

From Liberty to Abundance

From Abundance to Selfishness

From Selfishness to Complacency

From Complacency to Apathy

From Apathy to Dependence

From Dependency back again into Bondage

In 15 years our United States will be 200 years old. This cycle is not inevitable—

IT DEPENDS UPON YOU!

ELECTRICAL WEST's cover features the McDowell family and their prime mover, Cecil, shift supervisor at the Ocotillo power plant of APS. The cover is our Season's Greetings to one and all and our tribute to the "do it" guys that stand watch so that the rest of us can enjoy a Merry Christmas.

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ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

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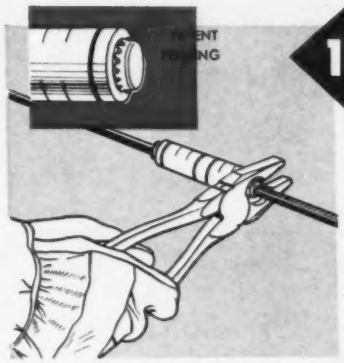
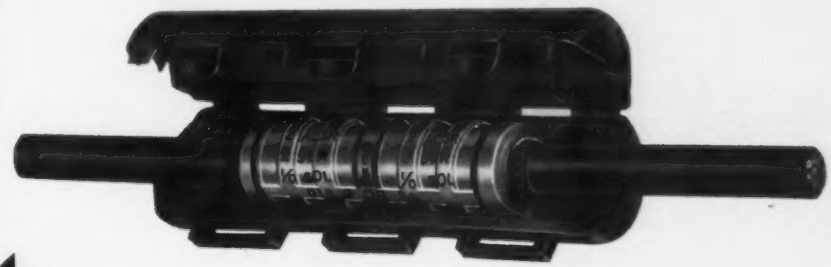
New . . . Quick . . . Neat . . . LOW COST

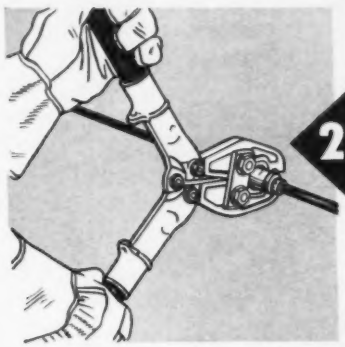
FULLY INSULATED SERVICE ENTRANCE SLEEVES



1

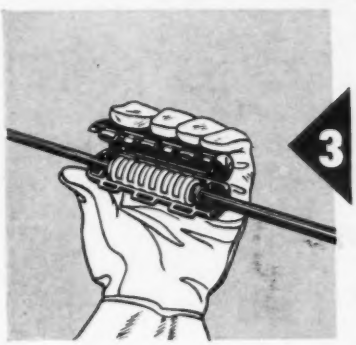
Pinch the exclusive Blackburn Crimp Collar with ordinary linemen's pliers. The pinched collar will hold the conductors firmly in the sleeve, leaving both hands free for easy tool manipulation. Conductors are fed directly into sleeve, insuring complete insertion.





2

Compress directly onto the full diameter aluminum sleeve with any compression tool having a 5/8" die. No insulation to damage. The cover is snapped on after the easy-to-see indents have been made.



3

Insulate Snap on the virgin polyethylene cover as easily as snapping your fingers. Cover has positive snap-locks that fasten it securely. It won't come off until taken off. Rain and condensation cannot be trapped inside cover —corrosion products will not build up. Fits all 5/8" sleeves up to 2 inches long. *Less expensive than taping.*

NOTE: Sleeves and covers may be purchased separately —additional savings if purchased as a unit.

WRITE for prices and Data Folder # 6112.

Jasper

BLACKBURN

Corporation

1525 Woodson Road • St. Louis 14, Missouri

For phone number of closest representative see advertising index in back of book.

R. A. KEPPLE, WEST PENN POWER COMPANY, WINS COMMERCIAL GOLD MEDAL POWER-UP AWARD

St. Vincent's College in Latrobe, Pa., faced a particularly tough water heating problem in 1960. R. A. Kepple, Commercial Representative for West Penn Power Company, solved it electrically. His unique approach requiring no increase in billing demand was judged the 1961 Gold Medal Power-Up Achievement Award winner in the Commercial Category.

The problem appeared to be simple. Hot water supply from the old tanks fell short of demand. Water was frequently rusty. The steam heating line was noisy and troublesome. When the old tanks sprang serious leaks in 1960, the situation became critical.

From a functional standpoint, electric water heating was the perfect solution. But to be economical, existing billing demand could not be increased. Simply heating during "off-peak" hours and storing hot water for use during "on-peak" required too-expensive storage facilities.

Mr. Kepple marshalled the full cooperation of St. Vincent's, West Penn Power and equipment suppliers. His solution, now in successful operation, employs a battery of strategically located electric water heaters. During "off-peaks" their operation is controlled by thermostat. Through use of a unique relaying system, they may also operate during "valleys" in the "on-peak" period.

St. Vincent's is delighted. The new system is safe, flexible and economical. Hot water is good and plentiful. More heaters are on order. West Penn has a happy customer with a better load factor and increased load.

Bronze Medal Power-Up Award winners in the Commercial Category are Jacob M. Gensburger, New Orleans Public Service, Inc.; Gerald A. Mattern, West Penn Power Company; and Raymond B. Faulkner, The United Illuminating Company.

E. C. LAWHORN, TEXAS POWER & LIGHT COMPANY, WINS INDUSTRIAL GOLD MEDAL POWER-UP AWARD

A fifteen-year search for ways and means to halt rising pumping costs in the Van Oil Field, Van Zandt County, Texas, was ended in 1961. The solution, recommended by Mr. E. C. Lawhorn, Power Consultant, Texas Power & Light Company, has earned him the 1961 Gold Medal Power-Up Achievement Award in the Industrial Category.

The problem centered on the use of natural gas engines for pumping operations. Operating costs, based on no-longer-valid circumstances, were going up. Maintenance and down-time were up. These factors were causing some potentially profitable wells to be considered marginal.

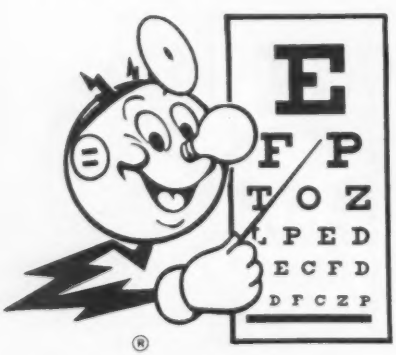
Mr. Lawhorn, working with the operating oil companies, T. P. & L. and an outside corporation to finance and lease the distribution system, proposed the installation of modern pumping equipment equipped with electric motors and automatic controls. Now in operation, this equipment has enabled the operators to use labor more efficiently, reduce maintenance time and expense and return some marginal wells to production. In additions, the new pumping units are far safer and less noisy in operation. Finally, Texas Power & Light gained a sizeable and growing load over a long term period.

Bronze Medal Power-Up Award winners in the Industrial Category are Paul R. Stewart, Pennsylvania Power and Light Company; Cornelius Ackerman, Public Service Electric and Gas Company; and Frank E. Yanaros, Florida Power and Light Company. The efforts of these men are shining examples of how the nation's electric utility power sales engineers help make electricity a more useful and widespread servant throughout commerce and industry. Westinghouse is proud to sponsor the Power-Up Program. *You can be sure . . . if it's Westinghouse.*

J-97501

Westinghouse

Are tired eyes slowing your office work?



Tired eyes are often the cause of slow and sloppy work. Is your office guilty of gloom-and-glare, shadows and "hot-spots" of light? Efficient lighting should be balanced . . . soft and even everywhere. When it is, eyes see faster (and people work better and more easily). Morale goes up—mistakes, down.

A PG&E Lighting Engineer will be glad to show you various ways to improve your office lighting. Phone the nearest PG&E office for this free Reddy service. For your complimentary copy of "Recommended Levels of Illumination" for industrial and commercial establishments, write Northern California Electrical Bureau, 1355 Market St., San Francisco 3.

NORTHERN CALIFORNIA ELECTRICAL BUREAU

this message sponsored by **P·G and E·**
Pacific Gas and Electric Company

Merry Christmas

To all our 1961 customers, including the cities of Los Angeles; Fort Pierce, Florida; and Troy, Ohio, for turbine generators ☞ American Electric Power for communications equipment ☞ Outboard Marine Corp. and The Budd Company for electric furnaces ☞ Arizona Public Service for transformers ☞ Alabama Electric Cooperative for airblast circuit breakers ☞ and the many other U.S. companies, large and small, with whom we are pleased to do business.

To the scores of U.S. suppliers from whom we bought materials and equipment this year.

To the men and women in our affiliated sales and service organizations throughout the U.S.

To our 73,000 co-workers in Brown Boveri's 40 plants and in our sales and engineering offices in over 80 countries of the Free World.

To G.E., Westinghouse, Allis-Chalmers and our other competitors for adding zest to our efforts.

from Brown Boveri

Full-line manufacturer of electrical and mechanical power equipment for industry and utilities. Brown Boveri Corporation, 19 Rector Street, New York 6, New York

WHEN THE FUTURE IS ALL-ELECTRIC

WHY BUY ANYTHING BUT A ***TOTAL-ELECTRIC GOLD MEDALLION HOME?***

"In our new Gold Medallion Home, we get so much more of what we're really *living* for," says Mrs. Nowers. "I have more time for my family and for my community work, and I'm a much better home manager since we moved in. A home without everything electric would seem old-fashioned to me now. I'll never go back."

Count the things that change for the better:

1. Flameless electric heat. "It's like living in mild sunshine," says Mrs. Nowers. "Our walls and drapes stay remarkably clean."

2. A flameless electric range. "So cool and *fast*. And no other way to cook is nearly so clean."

3. A flameless electric oven. "The same good things can be said about my electric oven. In addition, the juice stays in the meat because I cook with heat that's moist, not dry."

4. A flameless electric dryer. "My clothes dry even sweeter and fluffier than they used to outdoors. I don't get any baked-in wrinkles, either."

5. A flameless electric water heater. "We get all the hot water we want, quickly and inexpensively," says Mrs. Nowers.

WHAT IS THE GOLD MEDALLION HOME AWARD?

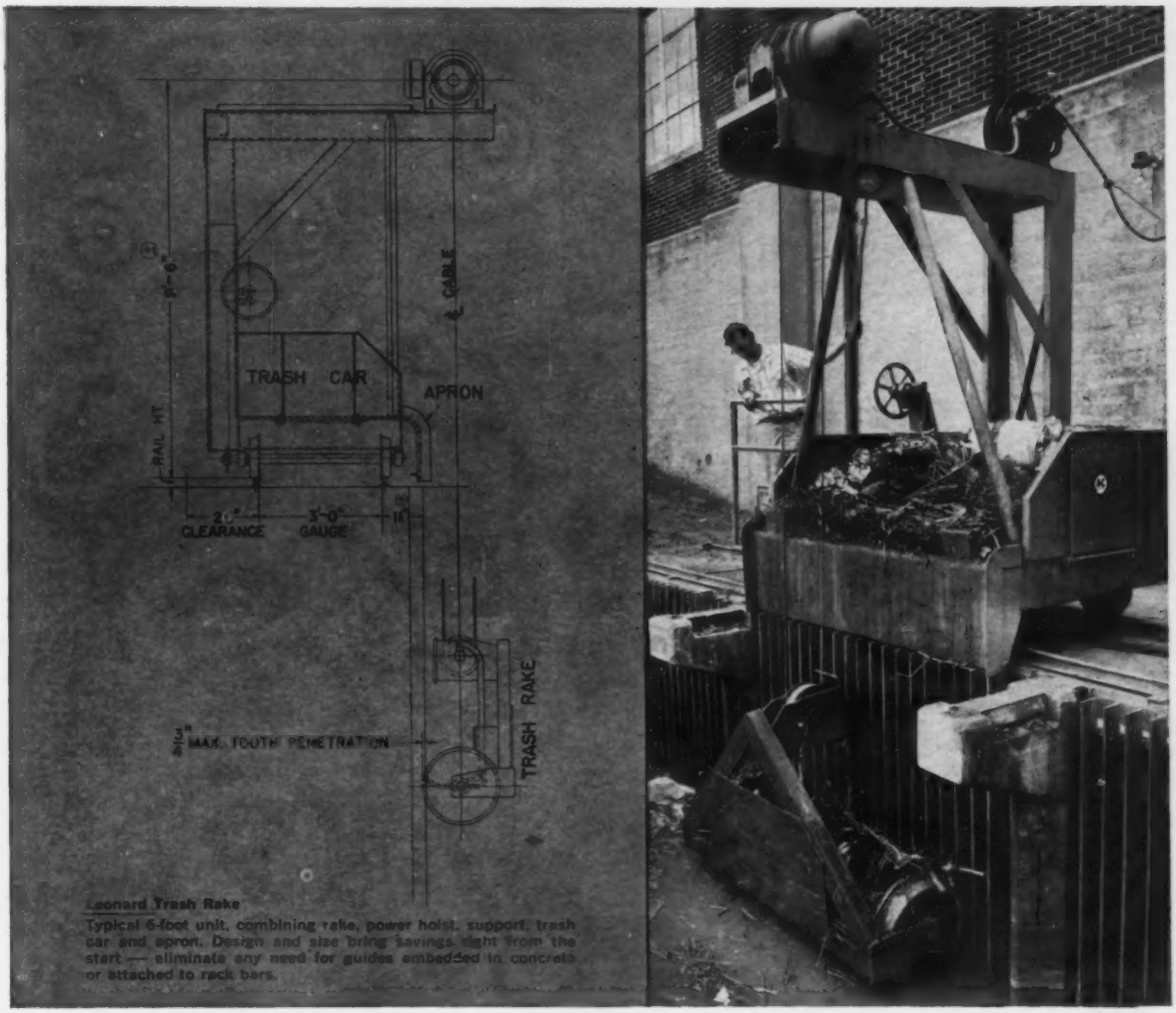
It is an award given only to total-electric homes that are electrically up-to-date. When a new home meets Gold Medallion Home requirements you know it offers: *clean, flameless, electric space and water heating; a clean, flameless, electric kitchen*, equipped with major appliances; plenty of "*Housepower*"—modern wiring to handle today's and tomorrow's appliances; *abundant lighting*, planned for comfort, convenience and beauty.

It costs so little to live better electrically. Why not move up to a total-electric Gold Medallion Home?

SOUTHERN CALIFORNIA Edison COMPANY

Home of Dr. and Mrs. Walter J. Nowers, Palos Verdes Estates, California. Earl R. Mason, A.I.A., Architect.

ALLIS-CHALMERS



Leonard Trash Rake
Typical 6-foot unit, combining rake, power hoist, support, trash car and apron. Design and size bring savings right from the start — eliminate any need for guides embedded in concrete or attached to rack bars.

Cleans up costly head losses

. . . rakes-in savings enough to pay for itself!

Here's intake-trash removal so far ahead of hand methods that *"once sold is sold forever!" Leonard* trash rake installations deliver savings both in reduced head loss and labor costs. And they bring a permanent solution to shortages of people to do the job — make trash removal a one-man operation.

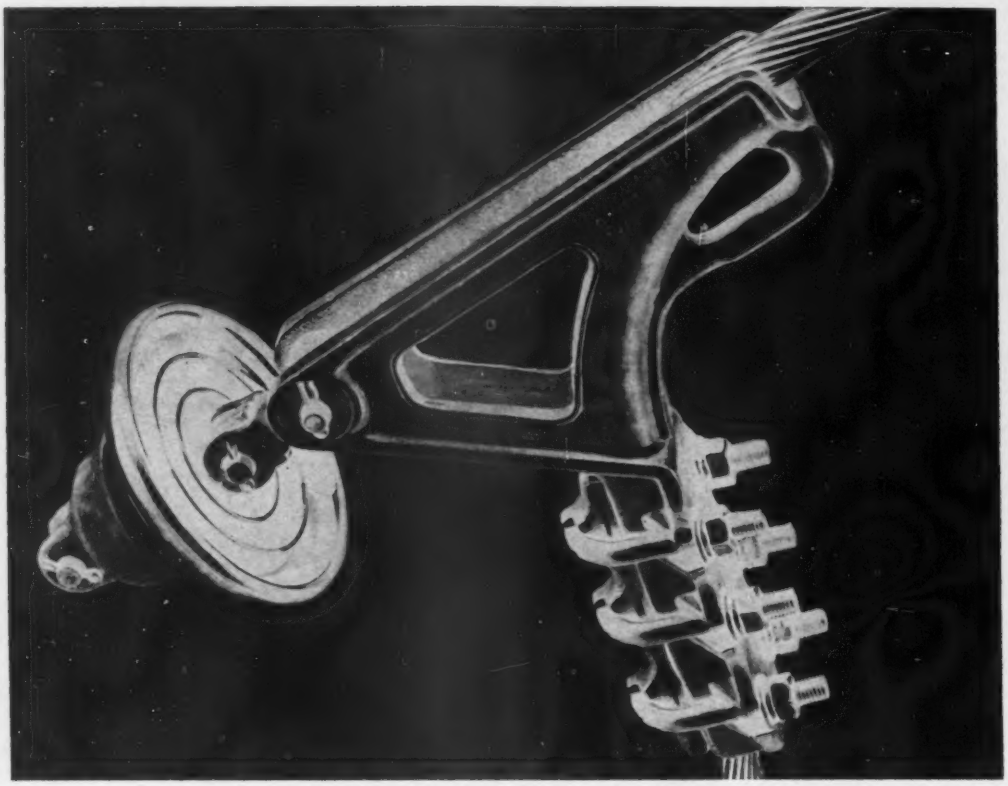
Leonard trash rakes roll right down your existing rack bars whether vertical or inclined. Because no channel guides are needed, they freely ride over stubborn obstructions, dig them loose, scoop trash up to the waiting receptacle or car. Self-dumping units also are available—both log-grapple and regular models.

With Allis-Chalmers trash rakes even the initial investment is low. Width is held to the logical minimum required for adequate handling of trash . . . standard 6- and 8-foot sizes. Larger units special. Your nearby A-C representative has full details. Or write **Allis-Chalmers,** Hydraulic Division, York, Pa.

Leonard is an Allis-Chalmers trademark.

A-1307

For phone number of closest representative see advertising index in back of book.

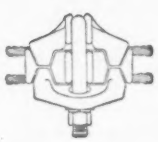


WHAT'S IN A BETHEA CABLE FITTING?

Millions of Bethea Clamps have been supplied to electric utilities in this country and abroad. All are designed, tested, produced and guaranteed to meet the most rigid industry requirements.

For example, Bethea dead end clamps offer unusual effectiveness and economy — for every application. From two U-bolt standard styles with superior holding power, to multi U-bolt "specials" for greased core conductors, all have been designed for easy installation and hot workability. Materials are 356-T6 aluminum alloy body and keeper, high strength steel hardware and stainless steel cotter pins.

A clamp for every general and special application — write for catalog and test data.



QUALITY CABLE FITTINGS AND CONNECTORS

Bethea COMPANY, INC.

P. O. BOX 1407 — BIRMINGHAM, ALABAMA

FOR IMMEDIATE SERVICE CALL

MAYDWELL & HARTZELL, INC.
Representative nearest you:

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Tucson, Arizona — MAin 2-3331

120 So. 29th St.
Phoenix 34, Arizona — BRidge 5-7644

427 W. 5th St.
Los Angeles 13, Calif. — MAdison 8-7245

5823 Henley Drive
San Diego 20, Calif. — JUniper 2-6749

870 Tennessee St.
San Francisco 7, Calif. — VA 6-6900

203 Genessee
Medford, Oregon — SPring 2-9195

2318 N. W. Vaughn St.
Portland 10, Oregon — CApital 8-4173

1214 Poplar Place—South
Seattle 44, Washington — EAst 3-1270

121 S. Monroe St.
Spokane 8, Wash. — MAdison 4-3285

NEW

WAGNER®

HI-THERMAL-CAP 65°C TRANSFORMERS

will lower your operating costs

Lower losses and loss ratios...
Lower impedances... Better regulation...
High capability for peak loads...
Insuldur® insulation systems

LIVE BETTER...*Electrically*

THEY OPERATE WITH LOW LOSSES

L_2FPL means lower losses for peak loads

This also means more economical operation at all loads. Core losses are low, copper losses have been reduced, resulting in lower total losses and lower ratios of approximately 2.5 to 1. This provides savings in cost of losses under normal loading conditions, and on overloads. Since the cost of losses greatly affects operating expense, the lower total losses add up to lower operating costs.

These new Wagner® Transformers will help you meet tomorrow's loads and their requirements reliably and economically.

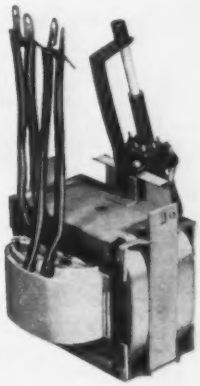
HANDLE PEAK LOADS WITH EASE

INSULDUR® Insulation System allows high thermal loading with 65°C rise transformers

The high thermal capabilities of Wagner HI-THERMAL-CAP 65°C Transformers result from the use of Insuldur layer insulation and high temperature epoxy coated conductors. The remarkable thermal-aging characteristics of Insuldur cuts insulation failure due to heat in half. Insulation retains full dielectric strength and binding qualities at 65°C operation.

MAINTAIN GOOD CUSTOMER VOLTAGE

Lower impedances improve voltage regulation



Impedances for ratings 100 Kva and below are 2% or less. You get minimum voltage drops even under high overloads—regulation problems are minimized.

Coils are wound with thermosetting resin on the layer insulation which bonds the coils together. The new endplate design gives positive bracing. This assures high short circuit strength of at least 40 times full-load current.

ARE SMALLER AND LIGHTER

Allow you to increase capacity without additional investment in new poles

The new Wagner HI-THERMAL-CAP 65°C, 25 Kva, 7200 volt Transformers are lighter and smaller—2½" shorter than their 55°C counterparts, yet use approximately the same amount of oil. They are easier to store and handle —take less space on poles. For example, a 55° 100 Kva transformer can be replaced with a 65° 167 Kva transformer.

WITH ALL THE FEATURES YOU WANT

SIMPLIFIED ENDPLATE DESIGN

The new endplate assembly provides rigid construction for greater mechanical strength. Virtually all nuts, bolts, screws, individual coil clamp blocks, springs, thimbles, angle irons and brackets are eliminated. The assembly is smaller in size—lighter in weight.

PLASTIC-COATED COVER

A porcelain-like coating gives improved corrosion resistance to covers, protects from line to ground, insulates small animals from the grounded cover to prevent outages. Coating is applied to covers, to the Shur-Seal clamping ring, and to cover bolts.

NEW LV BUSHING ASSEMBLY

The re-designed LV bushings for transformers through 167 Kva provide better gasketing. Terminals are larger to accommodate aluminum conductor. Special lock washers provide better clamping for conductors.

HV BUSHING DESIGNED FOR SAFE INSTALLATION

Heavy wet-process porcelain HV bushings, with undercut petticoats, have insulated knob for hand tightening of terminals. All 2400 v and 4800 v transformers have HV bushings arranged to facilitate application of arresters.

Plus... **HIGH TEMPERATURE INSULATING OIL — LONG-LASTING SURE-SEAL PAINT — ROLLED UNDER BASE DESIGN**

For additional information on this new dollar-saving line of Wagner® HI-THERMAL-CAP 65° C Transformers, ask your near-by Wagner Sales Engineer, or write us.

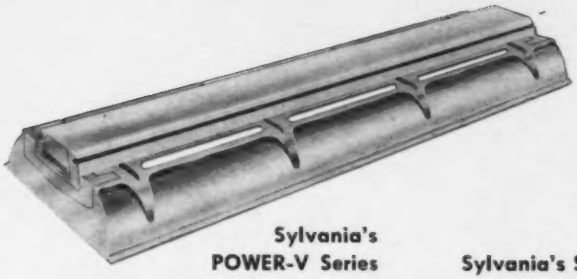
Wagner Electric Corporation

6381 PLYMOUTH AVENUE, ST. LOUIS 33, MO., U.S.A.

Manufacturers of LOCKHEED® Products

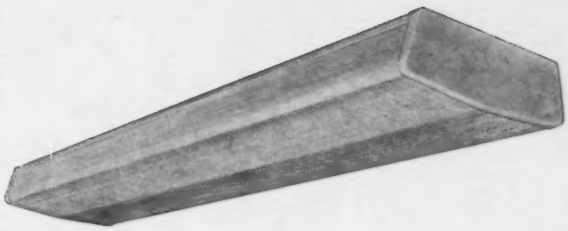
WT61-18

For phone number of closest representative see advertising index in back of book.



Sylvania's POWER-V Series

A completely new line of industrial fixtures. Power-V fixtures are NEAT, POWERFUL, RUGGED, SIMPLE. Wide choice of models and lamp types. Designed to meet or exceed RLM standards. The ideal answer to industrial lighting problems.



Sylvania's STYLUS Series

A new budget-priced 'wraparound' fixture of one-piece patterned plastic. Features shallow modern styling. Combines high lighting efficiency with sturdy construction for surface mounting. Excellent for offices, lobbies, stores and other commercial applications.

Check the features of these

New SYLVANIA Lighting Fixtures

If you haven't followed the progress of Sylvania's fixture developments in recent years, now is the time to get the complete story. In all phases of fluorescent lighting, you'll find Sylvania on top . . . today more than ever before.

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS INC.
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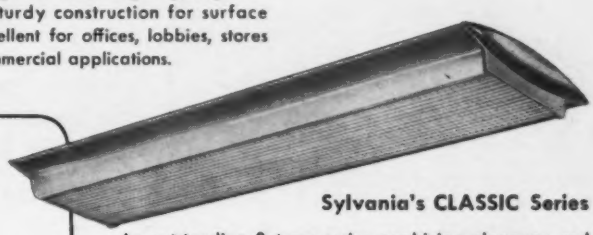

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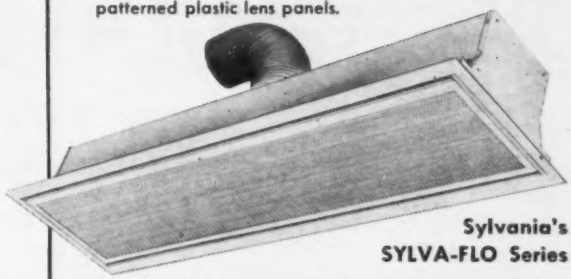

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Combines Lighting and Air Distribution in one efficient unit. Provides as much as 20% more light output, longer ballast life and true lamp color. MULTI-VENT system of air distribution provides superior air-conditioning.

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4112 Fiftieth Ave., South,
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5757 Huntington Dr., North,
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SUBSIDIARY OF
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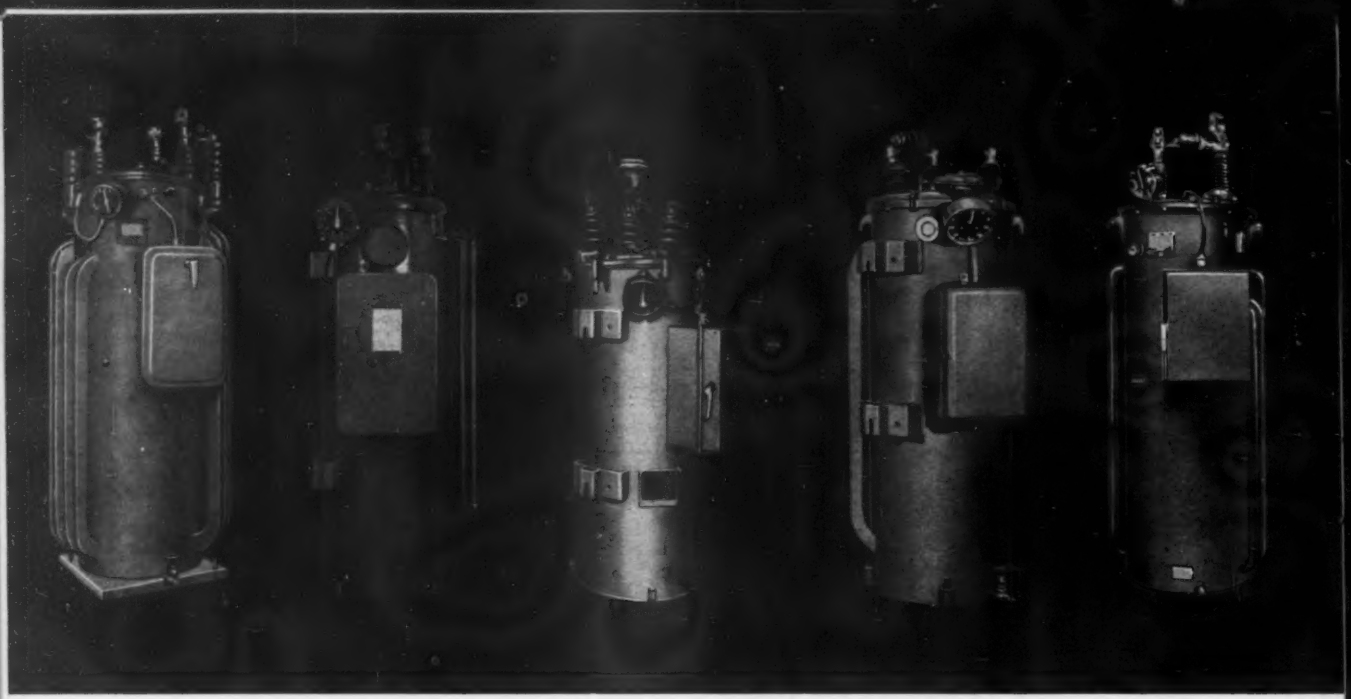
GENERAL SYSTEM



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IN THE AREAS OF . . .

ACCURACY—Bandwidths of ±¾ volt are possible with the G-E type ML-32 regulator. Why: 32 steps, plus unique Micro-Band* calibrated relay.

LIFE—General Electric regulators are designed to exceed the service life of competitive units. For proof, compare the life expectancy data published by G.E.

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FEATURES—G.E. eliminates marginal gadgetry. Costs go into truly beneficial features, such as switch strength, internal Thyrite® bypass arresters for more even voltage distribution, and plug-in controls for speedy inspection.

MAINTENANCE—No need to untank G-E regulators for periodic inspection of contacts. Why: electrostatic shielding and Opti-Life switching are features of *all* G-E step regulators.

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FOR ALL THE REASONS WHY G-E regulators are your best Total-Value Buy, contact your General Electric regulator representative. Or, write General Electric Company, Section 456-9, Schenectady 5, N. Y. *Voltage Regulator Products Section, Pittsfield, Mass.*

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Progress Is Our Most Important Product

GENERAL ELECTRIC

When you go underground...

...go with those who know

Rome Cable Division of Alcoa announces a new service for utilities

Whether or not underground becomes *the* distribution system of the future is in your hands.

But the day you decide that you're going underground, Rome is ready.

Ready with cable for duct or direct burial. Ready not only with a full line of primary and secondary cables, but also with knowledge and experience in types of systems, installation, maintenance and trouble-shooting.

Cables, of course, are our basic interest, because that's what we know the most about. And it's what our engineering skills and facilities are devoted to . . . exclusively.

Since the cables we've designed and built for underground cover the full range, you can be sure that any recommendation will be based on your needs rather than merely on what's available.

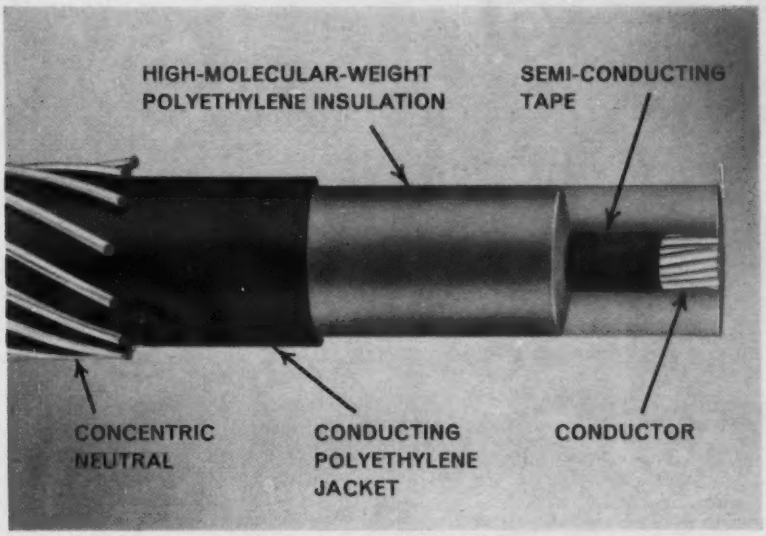
So we issue this invitation: Come to Rome when you're ready to go underground. We're ready now—with the cable you need as well as with people who can give you expert counsel.

And, starting with this issue of this publication, we will publish a monthly sheet covering various aspects of Underground Residential Distribution. Look for the big URD designation. Another service to utilities from Rome Cable Division of Alcoa, Rome, New York.

URD

UNDERGROUND RESIDENTIAL DISTRIBUTION

What to look for in primary cable



Typical of the Rome primary cables for underground use is this 15 KV design available with copper or aluminum conductor, high-molecular-weight polyethylene insulation, conducting polyethylene jacket and a concentric serve of tinned copper wires. Concentrically served neutral also provides increased safety and protection.

Let's start with *insulation*. When you come to Rome for your cable, you have a choice. You can select from oil-base rubber like Rome Rozone, butyl-base rubber, or polyethylene.

All are well suited to underground systems, since they offer a high degree of ozone resistance, exceptional moisture resistance, and excellent dielectric stability.

From a cost standpoint, polyethylene offers many advantages. Since it was introduced in 1940, it has had a long history of successful operation in radar and communication circuits as well as in power, control, and submarine-telephone cable. Polyethylene is ideally suited to high voltage applications, its use for ratings through 15 KV being well documented in IPCEA specifications.

How about *shielding*? IPCEA recommends it for single-conductor cables above 3 KV, either for direct burial or underground ducts. We provide shielding through metallic tape, lead sheath which can also serve as all or part of the neutral return, or concentric wrap of tinned copper wires, all in conjunction with semi-conducting tapes or jackets. (Note: Such a concentric provides not only shielding, but also neutral capacity and safety for personnel in event of "dig-in.")

Rome offers, as standard, many different primary cable types. All are rated at 5 KV or 15 KV, with grounded neutral. Chances are good that from this array you can match your needs. If not, we'll work with you on design and production of just the right cable.

We're ready to go underground any time you are—with the right cables to do the job. We'd be happy to provide specs and discuss details. Call the local Rome-Alcoa sales office for more information. Or write to the address indicated.

Reliability of underground among its many advantages

There can be no question that underground systems add to the attractiveness of residential areas.

In addition, properly designed systems also offer many advantages to the utility. Reliability of service is one of these and an important one in view of the trend toward the all-(or almost all-) electric home.

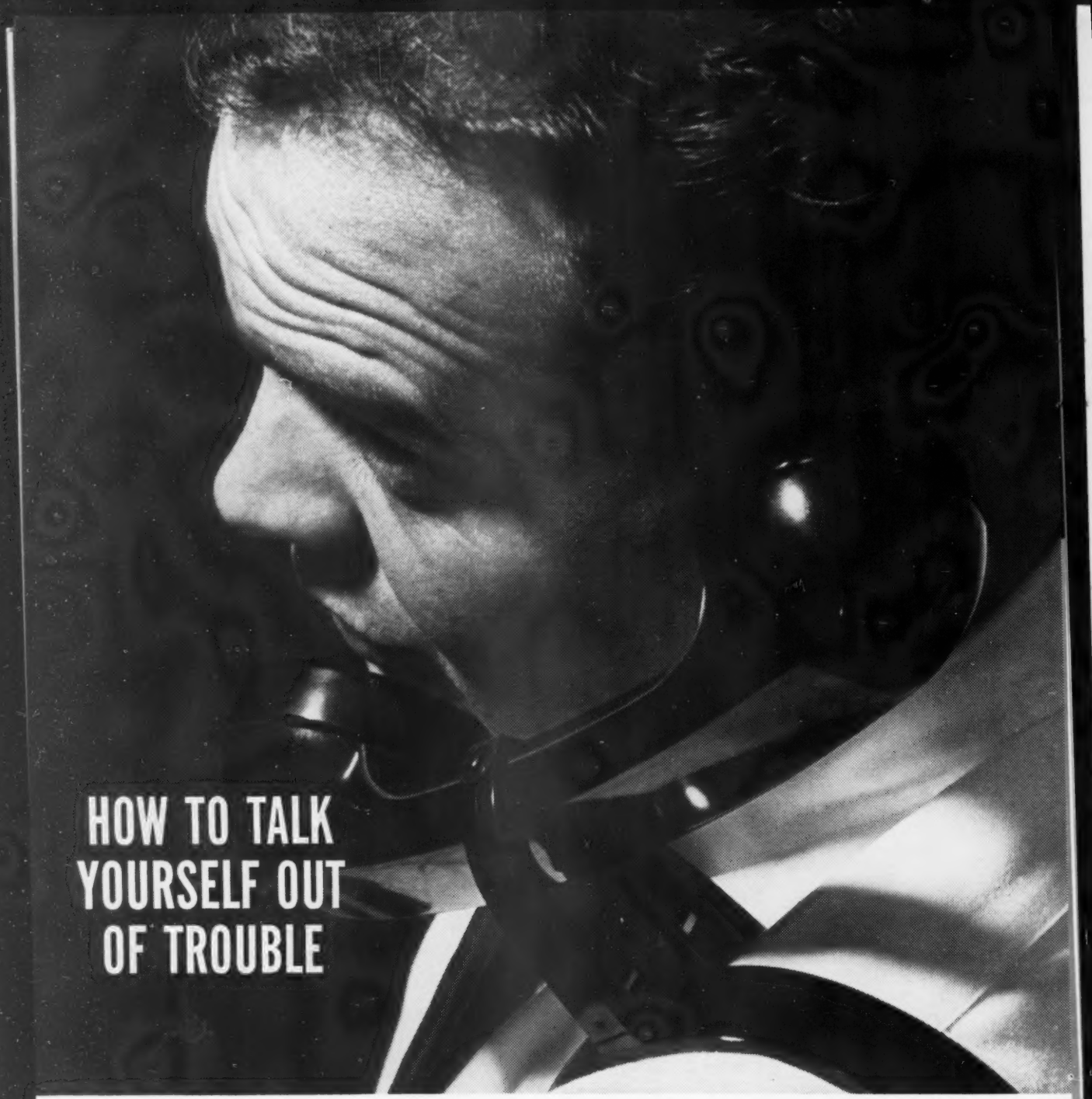
Past performance indicates that reliability of service—as measured in cable failure rates—is better with underground than overhead systems.

The fact that underground systems are less susceptible to damage from storms means not only reliability, but also lower maintenance costs in many cases.

OFFER: Some of the material summarized here has been taken from our just-published manual on Underground Residential Distribution Systems. In its fact-filled pages you will find much useful information, including complete data on Rome products. A note on your letterhead will bring you a copy. Write to: Rome Cable Division of Alcoa, Dept. 2-121, Rome, New York.

①

ALCOA
ROME CABLE
DIVISION



HOW TO TALK YOURSELF OUT OF TROUBLE

Costly breakdowns often start right in the lube room. Before they do, talk to your Standard Engineer. He can recommend the right lubricant to meet your special needs . . . solve problems *before* trouble begins. For example, Chevron Duraplex Grease-EP may be the answer to expensive lube errors. This versatile grease can be used plantwide to protect many kinds of bearings. The West's largest field force of lubrication engineers is at your service. Call your Standard Man today. His services are free.

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1. Core nests in base-plate sump.
3. Dropover tank design cuts untanking height and weight.
2. Heavy inside tank bracing eliminates outside stiffeners.
4. Captive-type handhole bolts. No small parts loss.

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Allis-Chalmers engineers re-examined, then redesigned small power transformer mechanical features . . . all to *your* advantage! Check their latest achievements:

1. Easier to handle, move and install. Lower height, center of gravity and weight achieved through a unique base-plate sump that houses the lower section of the core.

2. Repainting simpler — self-cleaning tank reduces maintenance. Internal tank wall bracing eliminates outside debris-catching, rust-prone tank channels.

3. Smaller untanking facilities required. Dropover tank reduces untanking height and weight 50%.

4. Internal inspection quicker and safer. No more dropping manhole cover nuts or bolts into the tank or onto the ground. Only five captive-type nuts and bolts need be loosened to remove cover. Excellent seal and reusability achieved through use of Buna-N gaskets.

Your nearby A-C office can furnish facts and Bulletin 61C6084B, or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.* A-1396

"I don't know who you are.

I don't know your company.

I don't know your company's product.

I don't know what your company stands for.

I don't know your company's customers.

I don't know your company's record.

I don't know your company's reputation.

Now—what was it you wanted to sell me?"

MORAL:
Sales start before your salesman calls—with business publication advertising.

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PUBLICATIONS

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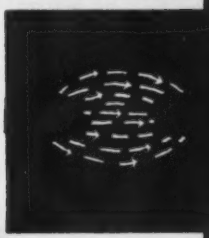
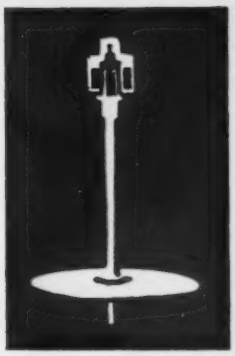
Background and history of metering

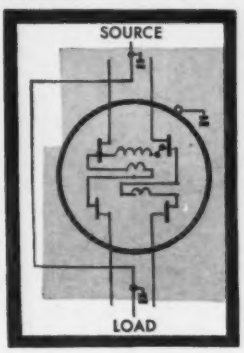
Principles of electricity, magnetism

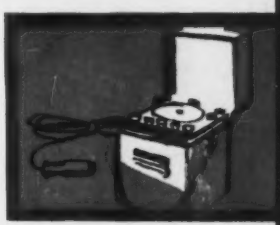




Components and their functions

Application and installation





Testing, inspection and maintenance

ANOTHER GENERAL ELECTRIC METERING EXTRA . . .

Meter courses help utilities train personnel

Two meter courses—one each on single-phase and polyphase designs—are conducted by General Electric at its Somersworth, N. H. plant and utility locations to assist utilities in training their personnel.

Basic information and new metering advances are provided on all single- and polyphase subjects, plus field training on demand meters and registers.

For example, the single-phase course covers five areas: background and history; principles of electricity; components and their functions; how to select and install meters; how to test, inspect and maintain meters. The polyphase meter training course is equally as comprehensive.

Complete courses are available in kit form for inclusion in utility training programs. For more information on how your metering personnel can benefit from these courses, contact your General Electric Sales Engineer. 713-11

YOU GET ALL 10 METERING EXTRAS FROM GENERAL ELECTRIC

- Jet Stream Service
- Statistical Sample Testing Seminars
- Certified Quality
- Meter Courses
- Low Cost per KVA
- Application Assistance
- Product Service
- Load Building Programs
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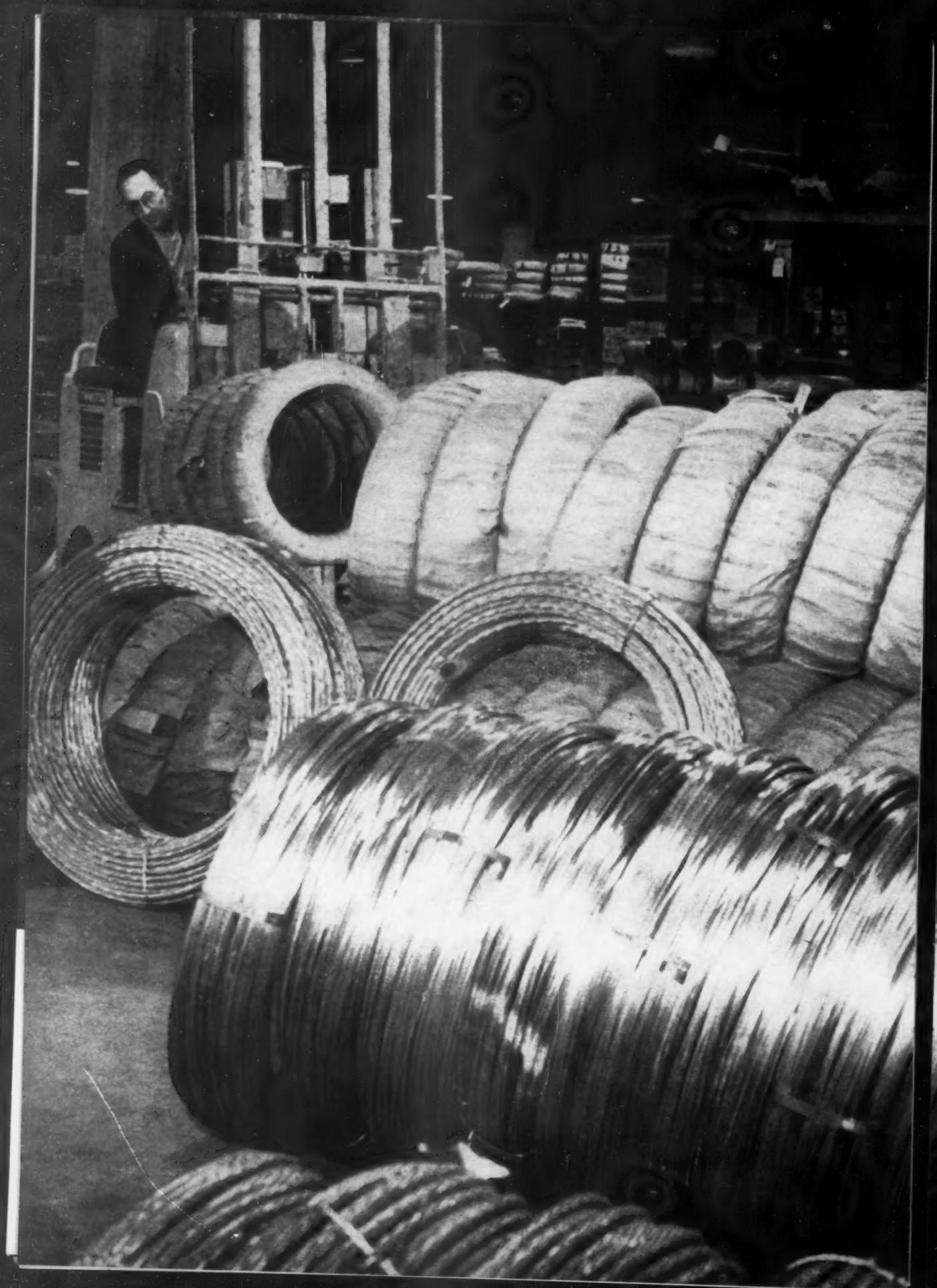
GENERAL ELECTRIC



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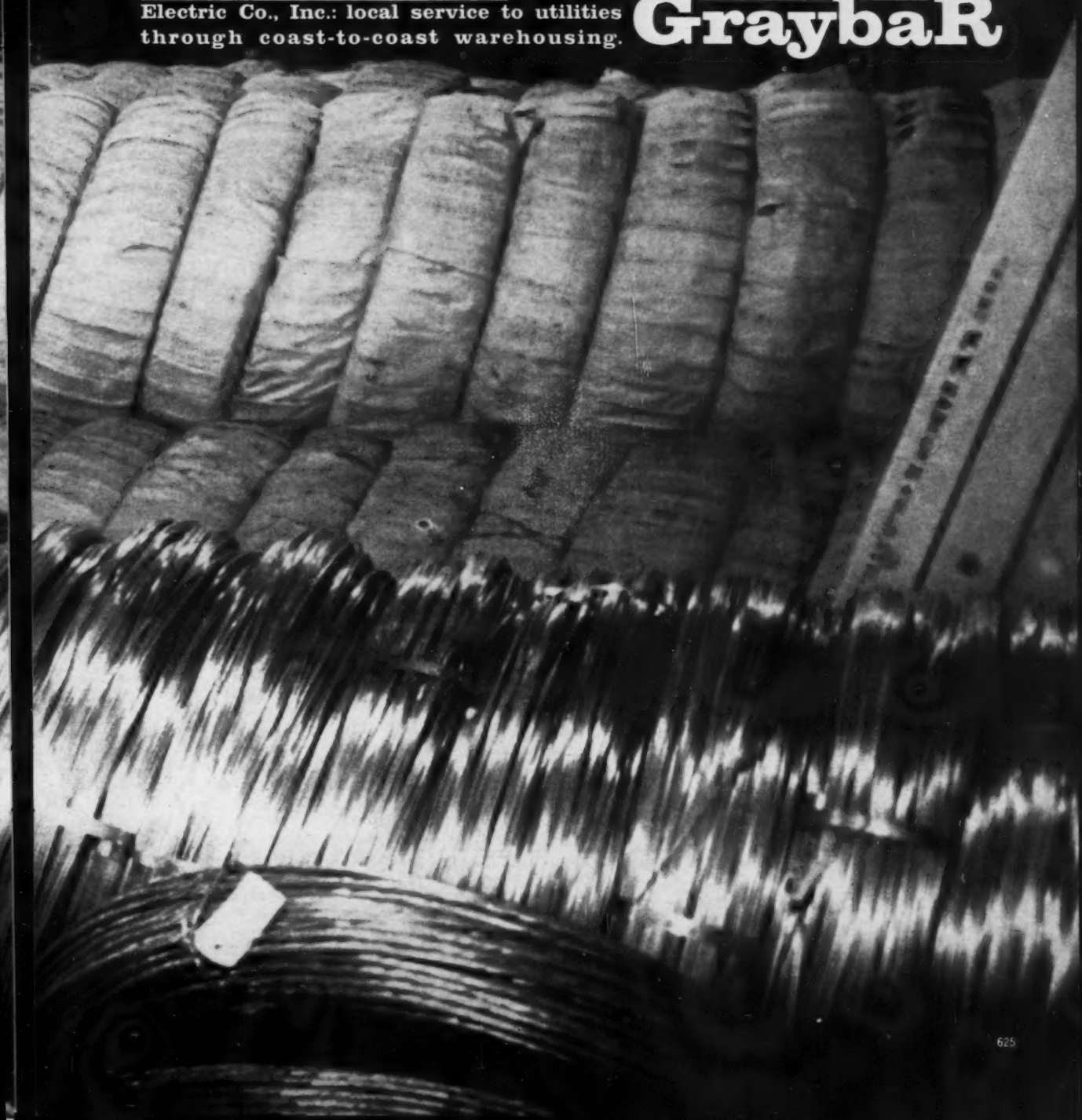
You're inside one of over 130 local Graybar service centers—looking at what could be just part of your inventory, without a penny's investment. With such easy availability of electrical supplies, why should you pay the "cost of possession" that's the penalty of do-it-yourself warehousing? Let us stock most of your supplies until you need them. Let us work out with you a planned purchase program, so we know what you need and keep it on hand—even if your requirements are unusual. That way, we can give you same-day delivery of probably 95% of your requirements—and your inventory investment is cut to the bone. ■ Yes, think of Graybar's stocks as your own inventory, and call Graybar—for everything. Graybar Electric Co., Inc.: local service to utilities through coast-to-coast warehousing.

GraybaR



NEWS

Edited for the electrical industry of the West

Tombstone Citizens Accept APS Offer

Citizens of Tombstone, Ariz., went to the polls in record numbers Nov. 14 to accept Arizona Public Service Co.'s offer to buy their electric and gas systems. Of the 451 registered voters, 420 turned out to vote 261 to 159 in favor of selling.

The resort and retirement community has 419 electric and 315 gas customers.

Known as "the town too tough to die," Tombstone has a colorful history in which the Earp brothers and other early day figures played a prominent part. In the 1880s it was the site of one of the richest silver strikes in the nation and at the height of its fame had a population of 15,000.

Now with the help of Arizona Public Service it hopes to grow again and become the center of Western history. The $315,000 the utility will pay for the systems will be sufficient to completely retire the city's bonded indebtedness, place its water system in first class condition and leave a surplus that will make Tombstone one of the state's most solvent cities.

Would Abandon Plant

Lincoln Service Corp. has asked Wyoming PSC approval to abandon its $100,000 steam-generating plant at Frontier, Wyo., a suburb of Kemmerer.

The company now buys power from Utah Power & Light Co. to serve Kemmerer, Frontier and parts of Sublette and Lincoln Counties.

The Frontier steam plant has been maintained for emergencies, but Lincoln Service now says Utah Power has guaranteed it sufficient power to take care of emergency situations.

Proceeds from sale of the Frontier plant will be used to improve the firm's electrical transmission system.

► **A two-for-one stock split** has been recommended by Maui Electric's board of directors and been approved by the PUC.

► Plan for a **three-for-one split** on its common and original preferred stock was announced last month by Southern California Edison Co. Shareholders will vote on the plan at a special meeting on Dec. 21. The company said it would pay dividends on the split stock at an annual rate of 96¢ a share or the equivalent of $2.88 a share on presently outstanding stock. The current dividend rate is $2.60. Word of the split pushed Edison common to a new high record of $103 on the Pacific Coast Exchange, a gain of $5.25 a share for the day. Earlier closing price on the New York Exchange was $100.

Trinity Dedicated

Secretary of the Interior Stewart Udall was the principal speaker at a ceremony dedicating the $56 million Trinity Dam, a unit of the Central Valley Project in California.

He timed the dedication to announce public preference agencies will get at least 250,000 kw of the power output of the Trinity system. Trinity power plant will have an installed capacity of 100,000 kw. Other plants in the Trinity development will have capacities as follows: Lewiston, 300,000 kw; Clear Creek, 134,000 kw; Spring Creek, 150,000 kw.

Udall said negotiations are under way between the Interior Department and the Pacific Gas & Electric Co. on a contract to set the exact amount of firm power that can be produced. The hydroelectric power from the government plants is firmed up through the PG&E system.

► **Gift of the facilities of radio station KEK-FM** to the **Oregon system of higher education** by Westinghouse Broadcasting Co. was made at a dinner meeting in Portland Oct. 25. Donald McGannon, president of Westinghouse Broadcasting, made the presentation. The gift involves property valued in excess of $100,000 and a record library worth $25,000. The state system will operate the Portland FM station in conjunction with its station KOAC in Corvallis. Transfer is subject to approval by the FCC.

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Study Ordered on Transmission Lines

The Upper Colorado River Commission has ordered outside consultants, paid by the commission, to conduct a study to evaluate transmission proposals for Colorado project power.

The commission is composed of members appointed by governors of Colorado, Wyoming, Utah and New Mexico, and a federal representative chosen by the Department of Interior. It administers the Colorado River Compact and serves as a liaison agency between state and federal departments.

Earlier the commission recommended approval of an investor-owned utility proposal for power line construction. This precipitated sharp reaction by governors of Colorado and New Mexico and the latest action compromises a smoldering feud in the commission.

Resolutions approved at a meeting in Denver provide for a report by Jan. 15 on all segments of the proposed transmission system requiring immediate construction and a final report by Feb. 15 on all other parts of the transmission plan.

Initial appropriations by Congress have authorized federal construction of the backbone lines. However, the commission's action is expected to bear on negotiations that Secretary of Interior Udall has indicated he will undertake to blend private and public construction of the transmission system.

The commission ordered that no more than $10,000 be spent on the study by the outside consultants.

NRECA in Sacramento

Legislation laying the necessary legal foundation for an exchange of surplus electric power between the Pacific Northwest and California will be recommended to Congress early next year, Bonneville Power Administrator Charles F. Luce told the Region 9 meeting of Rural Electrification Cooperatives Assn. in Sacramento Nov. 6.

He said that the draft being prepared by BPA was made necessary by requests from both the Senate Interior Committee and the Senate Appropriations Committee that legislation precede any intertie.

Norman Clapp, REA administra-

tor, said that his agency proposes to make loans for generation and transmission as an alternative for borrowers that are "unable to buy power for fair or reasonable terms or that find themselves forced to rely on a hostile source for their future power supply." Decrying what he called "pirating of the choice loads" as cities annex rural territories, long served by co-op systems, he urged state legislation for territorial protection.

More than 250 delegates attended the convention, which elected John Norlin of Redmond, Ore., as the region's executive committeeman for the national association succeeding Carl Bucher of Ft. Bidwell, Calif. Eugene, Ore., was selected as host for next year's convention and Spokane is being considered for the 1963 meeting.

Intertie Debated in Spokane

The proposed California-Pacific Northwest power intertie and the U. S.-Canadian Columbia River treaty were key topics discussed at the 28th annual convention of the Inland Empire Waterways Assn. in Spokane Oct. 23 and 24.

Assurance of regional preference for all Northwest power consumers before any intertie between Bonneville Power Administration and California is authorized was urged by several speakers.

Gordon C. Culp, Seattle, an attorney representing Corporate Services Inc., said a dependable regional safeguard should be set up before the proposed intertie is built. BPA Administrator Luce said a revised draft of proposed federal legislation to provide such protection was being made.

Declaring that BPA has been a Northwest asset, Culp said: "If a large federal intertie connects BPA with the federal system in the Southwest, I think we increase the risk that Bonneville will become just a northern outpost of a West Coast federal power system."

Henry H. Alderman, Portland, manager of Ruralite Services Inc., supported the intertie as a means of preventing an increase in BPA rates to nongenerating utilities. "A one-mill increase per kwh could in some cases change their operating statement from black to red," Alderman said. He believes such utilities are more concerned with the effect the intertie would have on the BPA wholesale rate than the possible loss of generation to another region.

Howard C. Elmore, Wenatchee, Wash., assistant manager of the Chelan County PUD, took a different view. He said that with construction of Canadian storage projects and Libby Dam the Northwest would no longer have a surplus of secondary power. "None of us would like to see a BPA rate increase," Elmore said, but he added that if there is a choice between assurance of power supply to meet customer loads and to develop the area's economy as against a continued low price for an insufficient power supply, "there is no question as to what the choice would necessarily be."

Jack D. Stevens, Seattle consulting engineer, told the group that Northwest utilities need safeguards to protect their future requirements. "Eliminating Bonneville's deficit is a worthy objective, but utilities in California do not appear enthused over the government constructing a transmission line to deliver federal energy to them.

"Secondary energy will not relieve them of the responsibility to construct power plants to serve loads when that secondary energy is not available."

A day-long panel discussion moderated by Sen. Warren Magnuson accepted questions from Northwest newspapermen on the intertie. The Columbia River treaty was discussed at a similar panel session, including representatives from both sides of the border.

ELECTRIC SHOVELS. Ordinary shovels were not good enough when the time came to break ground for the Electric Utilities Exhibits display at the Seattle World's Fair. The shovels being wielded here were fitted with jackhammers. Manning them are: left to right, Jack McCarthy, Washington PUD Assn.; A. B. Couch, Puget Sound Power & Light Co.; and Ewen Dingwell, fair manager. At left is a model of the $250,000 exhibit. The fair will open April 21

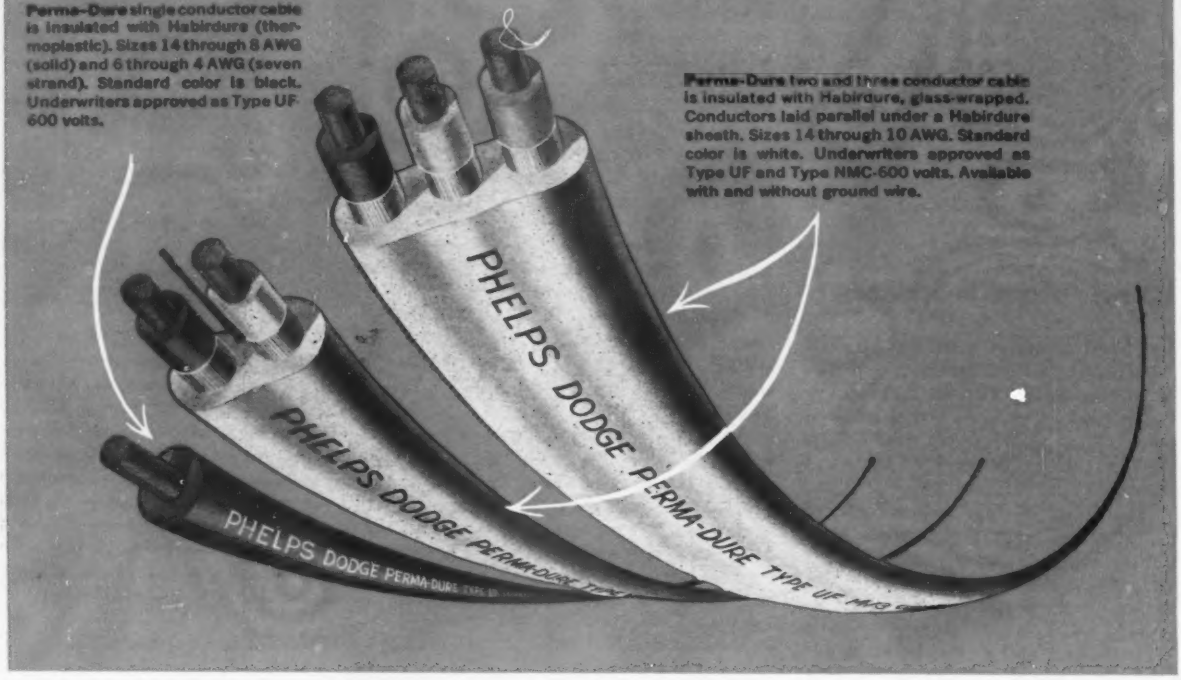
THE WESTERN UNDERGROU[illegible]MITTEE met in San Francisco Nov. 2 and 3 to discuss many problems of mutu[illegible]. Shown here, part of the group inspect the Marin B[illegible]y Country Club residen[illegible]d rground system. This system was described in detail in Jack Lawson's article in the November issue of Electrical West

multipurpose

Phelps Dodge Perma-Dure!

Perma-Dure single conductor cable is insulated with Habirdure (thermoplastic). Sizes 14 through 8 AWG (solid) and 6 through 4 AWG (seven strand). Standard color is black. Underwriters approved as Type UF 600 volts.

Perma-Dure two and three conductor cable is insulated with Habirdure, glass-wrapped. Conductors laid parallel under a Habirdure sheath. Sizes 14 through 10 AWG. Standard color is white. Underwriters approved as Type UF and Type NMC-600 volts. Available with and without ground wire.



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Perma-Dure, a Phelps Dodge product, provides electrical contractors with a durable, versatile type of flame-resistant cable for industrial and commercial use.

Perma-Dure handles easily, strips readily and helps cut installation time and costs. It is supplied in single, two and three conductors for feeder or branch circuits. Under the 1959 National Electrical Code, *Perma-Dure* is recognized as suitable for:

Type UF, single and multiple conductor, as feeder or branch circuit cable, for direct burial in the earth when provided with over-current protection.

Type NMC, multiple conductor (moisture and corrosion resistant non-metallic sheathed cable) for installation in exposed or concealed locations, in dry, damp or corrosive conditions; inside masonry or tile walls; or embedded, when suitably protected, in plaster or shallow chase in masonry.

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CORPORATION
300 Park Avenue, New York 22, N.Y.

P MINE TO MARKET D

Power Report Made

Coal took the play away from nuclear energy as a power source at a meeting of the Washington State Power Advisory Committee Oct. 27 in Seattle.

Construction of a generating plant at the Atomic Energy Commission's Hanford Works, converting heat created in the manufacture of plutonium at a new reactor, was discussed by Earl Coe, director of the state Department of Conservation; John Riley, assistant attorney general of the state; and Owen Hurd, managing director of the Washington Public Power Supply System.

Coe declared his department's only interest is in getting the power facilities built and that the state would withdraw from the power business as rapidly as possible. Hurd, whose organization previously had indicated it would be interested in building the nuclear generation project if the state did not, said only "this is not the time to worry about who is going to do the job." Riley gave a "preliminary and tentative" opinion that the state has authority to erect power facilities.

Sol E. Schultz, Seattle manager of H. Zinder & Associates, consulting engineers, spoke for coal. New economic studies indicate that a 500,000-kw plant to generate electric energy from coal, under financing by revenue bonds, can be a competitive source of power for the Northwest in the years ahead, he said.

Schultz gave the committee a preliminary report on studies being undertaken by his firm for the Kittitas County PUD, with funds provided by the Department of Conservation. The study reviews a 1958 report focused primarily on a 250,000-kw plant.

An investment of $52,460,000 currently would be required for a 250,000-kw plant and $80,198,000 for a 500,000-kw plant, including mining equipment, Schultz said. Working capital and financing costs would bring the total amount of a bond issue to $60½ million or $240 per kw for the smaller plant and $93 million, or $186.50 per kw, for the larger plant.

The 250,000-kw plant would have an over-all operating cost ranging from 6.98 mills per kwh at 50% annual load factor down to 4.77 kwh at 90% lf. On the same basis, the larger plant could operate from 5.82 to 4.06 mills, Schultz reported.

"I am convinced that economies can be made in fuel costs, particularly with use of newly established methods for hydraulic mining, that would bring the cost of electric energy from a 500,000-kw plant down to the range of 3½ to 4 mills per kwh," he said.

If dump power could be obtained at no cost from dams of two other PUDs on the Columbia River and integrated with power from the steam-generating plant, a blended cost of about 2 mills per kwh could be obtained, the committee was told. This would be lower than most new projects now proposed in the Pacific Northwest, Schultz said.

Failure of Congress to authorize generation of electric energy at the new Hanford reactor, delay in Canada's signing of the Columbia River treaty and fading of prospects for early construction on the Middle Snake River because of the fish controversy are responsible for heightened interest in steam generation from coal, declared the engineer. The Kittitas project requires no legislation, has no quarrel with fish interests and could deliver power within three years after money became available, Schultz said.

Army Favors Knowles

Major Gen. William F. Cassidy, director of civil works for the Army Corps of Engineers, told a news conference in Billings recently that the corps still favored building Knowles Dam as well as Libby Dam. He indicated that the corps is sticking by its recognition of Knowles Dam even if Libby Dam is built.

The proposed Knowles Dam on the Flathead River, near its confluence with the Clark Fork, has been given little chance of approval in view of the proposal for the larger Libby Dam on the Kootenai River in northwestern Montana.

Libby is involved in a U. S.–Canadian treaty for the Columbia River Basin development. Canada's delay in ratification has led to speculation that Knowles had a better chance of congressional approval.

The Army Corps of Engineers previously recommended construction of Knowles along with other major dam projects in the Northwest.

► Municipalities in British Columbia have indicated **little interest in a suggestion that they take over public transportation systems** now operated by the B. C. government. It is reported the government would like to get completely out of the transportation business, which it acquired when it took over the B. C. Electric. The Greater Vancouver system was reported by the B. C. Electric to be losing $5,000,000 a year.

Animated Model

An animated topographical model of Grand Coulee Dam and the Columbia Basin project is being built at Washington State University to serve as an exhibit at the dam's pumphouse starting next year.

The push-button unit will provide a recorded lecture for visitors and various features of the project will light up and unfold as the lecture proceeds. It will be built on a scale of 1 in. to 500 ft and will be 20 ft long and 9 ft wide.

The fiber-glass model will depict an area from the Canadian border to the mouth of the Walla Walla River on the Columbia River. It is being constructed by the Albrook Hydraulics Laboratory at WSU and will be shipped in one piece to the dam, located on the Columbia near Coulee Dam, Wash. WSU is building the unit for the USBR.

► A new commercial schedule instituted by the Clallam County PUD **lowers rates an average of 13%,** according to Manager Elmer Titus. The first 500 kwh cost 2½¢ per kwh, with the next 500 at 2¢, the next 1,000 at 1½¢ and everything over 2,000 kwh a month at 1¢. A demand charge of $1 a month per kw of demand is required after the first 25 kw. The kw demand created by fixed electric space heating equipment is subtracted from total demand before demand charges are applied.

► **Public use of the six recreation parks** provided by Pacific Power & Light Co. along its three 10-mile-long hydroelectric reservoirs on the Lewis River in southwest Washington surpassed all previous records during the 1961 summer season. John Beach, lands supervisor for Pacific Power in the parks area, reports 140,900 persons and 36,903 cars were checked into the picnicking, camping, swimming and boating parks, an increase of slightly more than 40% over estimates for the previous season.

► **Drilling of a pilot diversion tunnel** will be carried out by B. C. Electric before an application is made for a provincial water license for the Peace River power development, according to Hon. Ray Williston, B. C.'s minister of lands and forests. He said the tunnel would tell engineers a lot they did not know regarding the basic rock structure at the proposed power dam site. Details will determine the nature of the license application.

State Looks at Atomic Plant

Earl Coe, Washington State conservation director, has asked the Atomic Energy Commission if it would lease a site at Hanford Works upon which the state could build a nuclear electric power plant.

He also has asked for assurance on how long the AEC would provide steam energy as a by-product of the plutonium reactor now under construction at Hanford.

Following congressional defeat of a plan to build a federal power plant at Hanford, Coe proposed that the state build the $95 million facility. Federal legislation would be necessary before Washington could go ahead with the project by the issuance of revenue bonds. The state would have to reach an agreement with the AEC for operation of the reactor for steam production only in the event plutonium no longer was being produced for military purposes.

Contest Ban on Diesel Equipment

Use of diesel equipment in excavating a tunnel for the proposed Packwood Lake hydroelectric project became a legal issue, before construction bids were received.

The Washington Public Power Supply System of Kennewick, project sponsor, and the Spokane Chapter of AGC, several of whose members plan to bid the 27,000-kw project, filed suit Nov. 9 in Lewis County Superior Court at Chehalis, asking for an injunction against state officials who forbid use of the diesel equipment. The state officials are acting in accordance with state law, which prohibits use of fuel-burning equipment underground.

Owen Hurd, manager of the Power Supply System, said that the ban against diesel equipment, if upheld, would add $108,000 to cost of the project.

The development calls for a concrete dam below the outlet of Packwood Lake in eastern Lewis County, with a 17,000-ft, 72-in. water conduit.

► A new, specially built Fairbanks-Morse 2,000-kw generator will be placed in operation by **Hilo Electric Light Co.** To be located in the thinly populated Kau area, the self-contained unit can generate peak power within 90 seconds from a cold start.

► Report received in Seattle from the Federal Power Commission shows that Washington, which leads the nation in development of hydroelectric power, **also has the country's greatest amount of undeveloped power.** The state's power installations total 6,272,626 kw, the commission reports. Its undeveloped power potential is 19,133,600 kw, according to the report.

NEW TYPE OF LADDER CARRIER used on Seattle City Light line trucks saves the utility an estimated $600 annually. Previously, holes had to be cut into the body, so that the necessary springs could be mounted inside. Now the springs are mounted on an angle iron fastened to the outside of the truck. The ladder is on the outside of the frame and is easier to take off the truck, the utility reports

Bids

Power City Construction & Equipment Co. of Spokane was low bidder on USBR's 22-mile transmission line from Keswick power plant switchyard to Pacific Gas & Electric Co.'s Cottonwood substation. Bid was $1,158,392 on the line which will carry power from CVP Trinity River plant to the PG&E system.

A $2,546,141 contract for construction of Camino power house and penstock on the South Fork of the American River in El Dorado County has been awarded to M&K Corp. of San Francisco by Sacramento MUD.

Babcock & Wilcox was awarded the contract for two steam boiler units at Haynes steam plant by Los Angeles on a bid of $8,027,268.

Allis-Chalmers was successful bidder for the substation at the new Space-General Corp. plant in El Monte, Calif.

NUCLEAR NEWS

Safe Waste Disposal

The AEC has received a report on environmental surveys conducted at two deep sea sites off the Pacific Coast which are designated by the commission as areas where low level radioactive wastes may be disposed. These surveys reveal that there is no detectable radioactivity attributable to waste disposal operations at the two sites.

Concentrate Purchase

The AEC signed a new contract at its Grand Junction, Colo., office with Homestake-Sapin Partners of Grants, N. M., providing for the purchase through 1966 of uranium concentrates to be produced by the combined facilities of the two mills operated in the Grants area by Homestake-Sapin Partners and Homestake-New Mexico Partners. Concurrently, with the signing of the contract, Homestake-Sapin Partners acquired the assets of Homestake-New Mexico Partners.

Service Center at NRTS

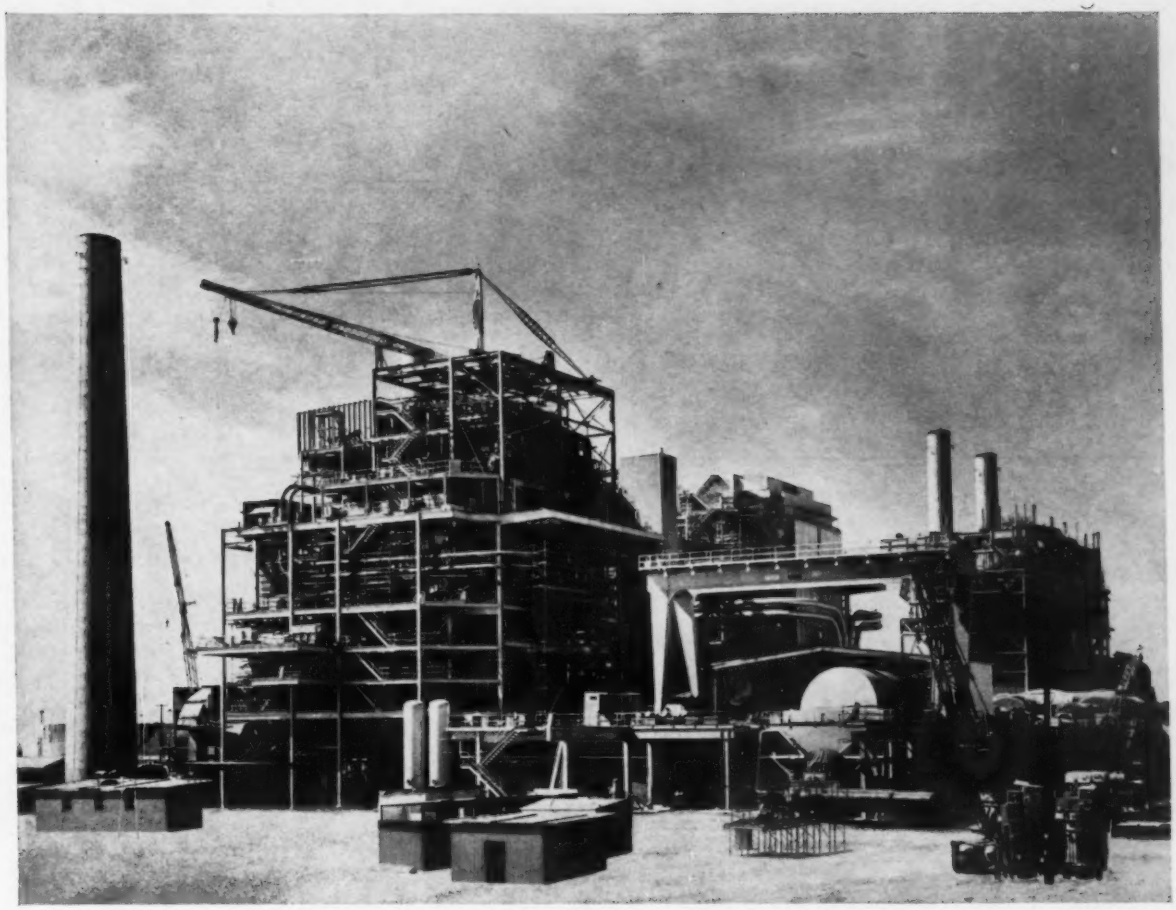
The Atomic Energy Commission recently announced it will issue plans and specifications for construction of the first phase of a new Technical Services Center at the National Reactor Testing Station's central facilities area. Estimated cost range of the work is $1,000,000.

The plan called for construction of technical space for the Special Power Excursion Reactor Test (SPERT) facilities, Materials Testing Reactor (MTF), and Engineering Test Reactor (ETR).

Sell Atomic Fuels

The AEC will seek authority in the next session of Congress to sell atomic fuels outright to federal and investor-owned electric companies. According to the *Wall Street Journal*, ". . . the AEC likely will recommend a gradual switchover to private ownership possibly extending over a 10-year period. During this time, it is calculated, there will be enough cost cutting advances in reactor technology to offset any higher costs from the ownership of the fuel."

► **The AEC** has given notice of intent to issue a construction permit



EARLIER ROLL DATES AT ALAMITOS

The 660,000-kw expansion of Southern California Edison Company's Alamitos Steam Plant is being completed on a fast schedule that was substantially tightened after construction started.

Two 330,000-kw units—computer-controlled—are involved. Unit 3, now on the line, beat the calendar by 30 days; next Spring's roll date for Unit 4 has been advanced 60 days.

With over 900,000-kw capacity, Alamitos becomes the largest plant in a system that Edison is constantly expanding to keep ahead of Southern California's phenomenal demand for electric power.

As on the original Alamitos plant, completed in 1957, Bechtel is responsible for engineering and construction of the expansion—working closely with Edison engineers.

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and license amendment to the University of Utah for relocation of its training reactor on the campus at Salt Lake City.

Largest Test Reactor

The Fluor Corp. has been selected as the contractor to build one of the world's largest nuclear test reactors, according to a recent announcement by the Atomic Energy Commission. The facility, designated Advance Test Reactor (ATR), will have an operating thermal power level of about 250,000 kw, compared with 175,000 kw for the Engineering Test Reactor (ETR) and 40,000 kw for the Materials Testing Reactor (MTR). The ETR is presently the world's largest nuclear test reactor.

Arizona Symposium

The University of Arizona in cooperation with Argonne National Laboratory, Argonne, Ill., will sponsor a symposium on current trends in nuclear power, Feb. 26 through March 2, 1962, in Tucson.

The symposium is intended for scientists, engineers and technical administrative personnel from universities, research laboratories and industrial organizations. Prof. Lynn Weaver, head of the nuclear engineering department of the university, is in charge of arrangements.

Plutonium Recycle

The plutonium recycle test reactor at Hanford Works near Richland, Wash., is now regularly operating at its design power level of 70 mw (t), according to General Electric Co.'s Hanford Laboratories, which operates the reactor for the AEC.

Officials said operating efficiency throughout October reached 56%, which they said is satisfactory for this type of test reactor operation. A 10-day continuous test run at full design conditions has been successfully completed.

Safety

Radiation control and protection of workers from exposure reportedly can be achieved more cheaply and effectively through use of a new portable type of alpha particle detection instrument developed from AEC research. A report of this research is available through the Office of Technical Services, Business and Defense Services Administration, U. S. Department of Commerce, Washington 25, D. C.

COMMUNICATIONS

NCUR Meeting

The National Committee for Utilities Radio, NCUR, held its advisory Council Frequency Coordinators Meeting in Washington, D. C., during the latter part of October. Western representation included: Harold Backen Jr., Douglas Electric Cooperative, Roseburg, Ore., and current NCUR chairman; R. A. Benson, Seattle City Light; R. L. Brinton, Pacific Gas and Electric Co., San Francisco; W. A. Leidigh Jr., Portland General Electric Co., Portland, Ore.; L. E. Ludekens, Southern California Edison Co., Los Angeles; Earl W. Rapp, Mountain Fuel Supply, Salt Lake City; and L. D. Martin, Arizona Public Service Co., Phoenix. Also present were representatives from other sponsor groups, the legal advisors and, informally, some members of the FCC.

It was brought out that the popularity of the 150-mc band has resulted in such decreased use of low-band and 450-mc assignments as to leave many channels unused—which could make the FCC wonder whether or not the Power Radio Service really has need for all of the channels assigned to it. It was particularly recommended that more serious consideration should be given to the use of 450-mc mobiles, wherever possible.

Joe Keller, the legal advisor, had some advice on filing the new FAA Form 117. It seems that the FAA, if it doesn't immediately approve the application as filed, makes no further attempt to study it but returns it to the applicant after an appropriate delay. To avoid this delay, he suggested that the applicant accompany Form 117 with a request that a study be made if clearance cannot be granted without it. So far no action has been taken by the FCC on NCUR's petition to restore several 150-mc channels that were taken from the Power Radio Service in Washington, Oregon and several southern states, and given to Forest Products.

Berkeley, Calif., was chosen as the site of NCUR's 1962 annual meeting, which will be held at the Claremont Hotel on June 19-22. Co-chairmen of the arrangements committee are Robert Brinton and Lee Hertzberg of the East Bay Municipal Utility District of Oakland.

► **Consolidation** of AIEE and IRE, which has been informally discussed

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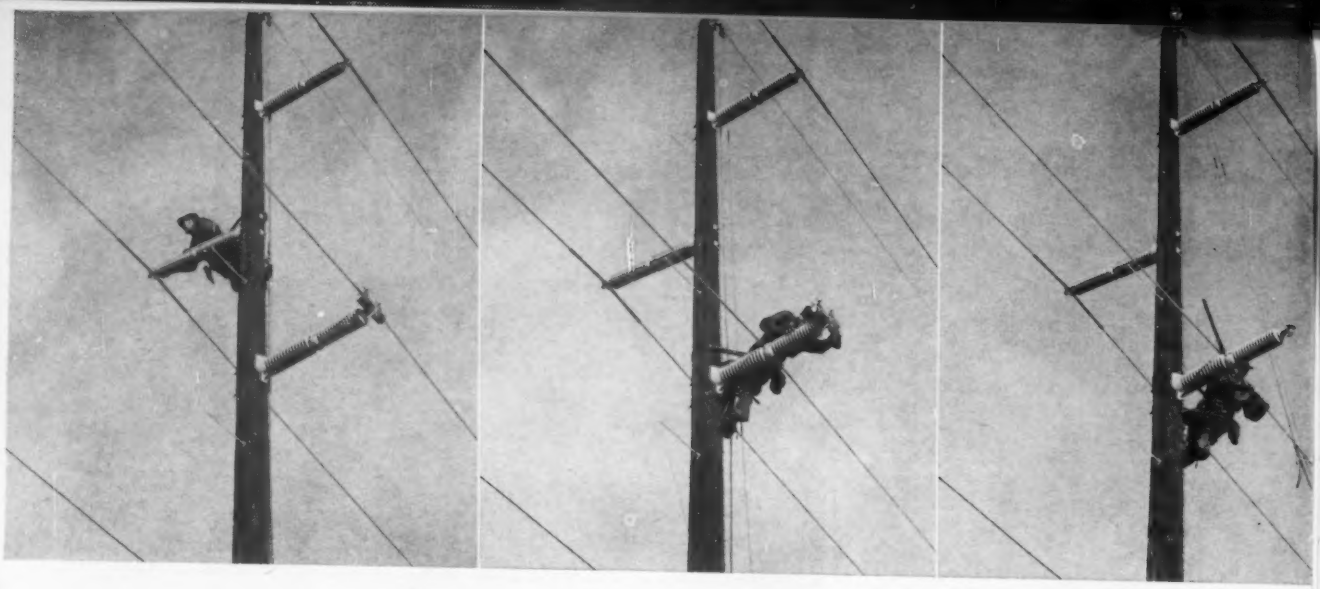
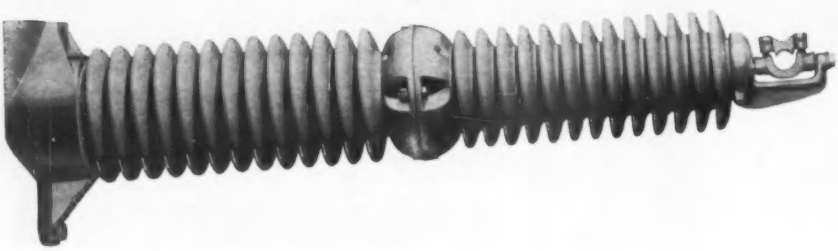


and now — HORIZONTALLY-



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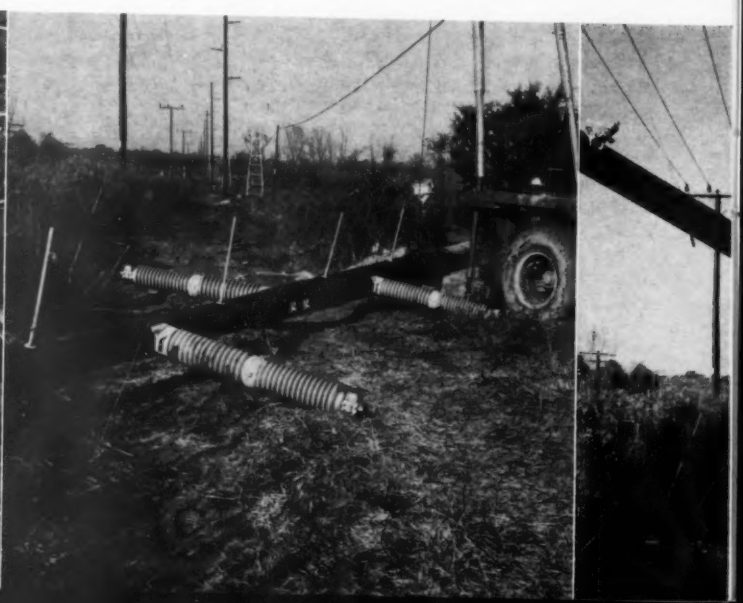

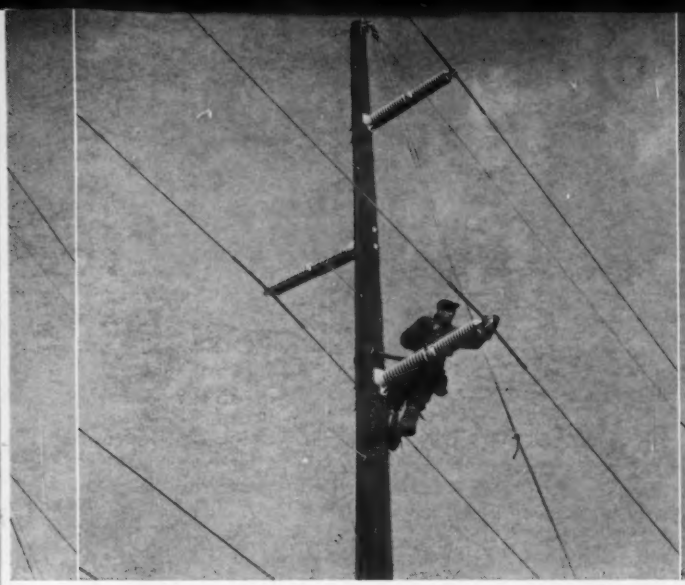

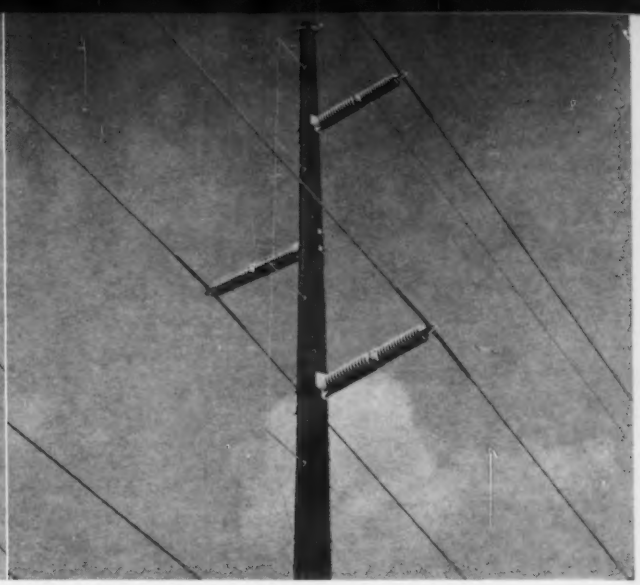

MOUNTED LAPP LINE POSTS FOR 115-138 kv TRANSMISSION

Armless construction using horizontally-mounted Lapp Line Posts is now a standard practice with many utility companies for transmission and sub-transmission lines at voltages up through 69 kv.

Now the same advantages of such armless construction are available for transmission at 115 kv and 138 kv. The externally-attached integral gain base is a malleable iron casting which provides maximum contact to pole. Insulator is bolted directly to the pole by bolts at top and bottom of the base. The structure is easily assembled on the ground before erection, as shown in the picture sequence below. Clamp-top head with trunnion clamp makes for easy one-man assembly to conductor.

Units of two strength classes are available, each in three lengths, which match (and, in some important characteristics, exceed) flashover values for strings of 6, 7, and 8 suspension insulators.

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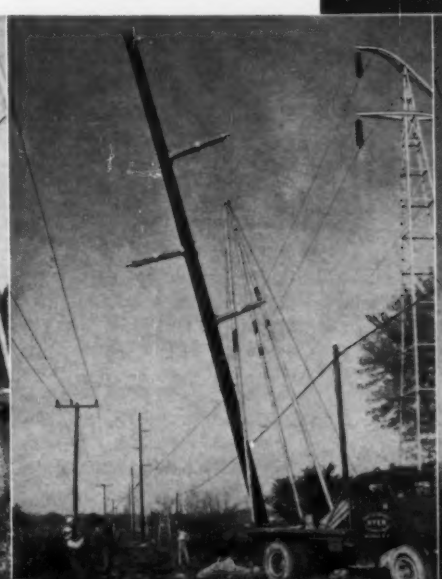

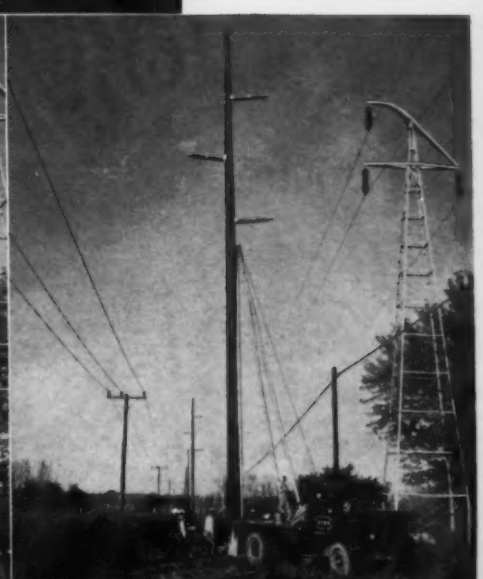

for some time, now appears to be a definite possibility with the appointment of committees by both organizations to study the merger and come up with recommendations that could lead to a membership vote and integration of the organizations early in 1963. AIEE is by far the most venerable of the organizations, but has a membership of about 70,000 as compared to IRE's 91,000. Because of the overlapping interests many individuals now belong to both organizations in order to keep well informed while others find this burden too great and are obliged to pick one and stay with it. If approved, the new society should not only improve the dissemination of technical knowledge but will provide a strong voice for engineers.

Back to Primitive Means?

Looks like a primitive means of providing a wide band communications channel is about to be resurrected by electric utilities. J. R. Linders of Cleveland Electric Illuminating Co. has written an interesting paper entitled *Coaxial Cable for Protective Relaying Communications,* AIEE paper No. 60-1247. The paper is also in the April 1961 issue of AIEE's Power Apparatus and Systems bimonthly publication.

It may be recalled that AT&T barely got its co-ax cable channels well started and then dropped them in favor of the far less expensive and more flexible microwave relay systems. Electric utility need for such channels came later, and consequently started out on microwave.

With microwave congestion already appearing in metropolitan areas, and the utilities requiring more wide-band facilities, co-ax is beginning to look good for short hauls up to perhaps five miles. Southern California Edison is actively investigating and testing such circuits for the Los Angeles area, and both Tacoma City Light and Idaho Power Co. studied the possibility of using them for video circuits, which were eventually placed on microwave because of the distances involved.

One major bottleneck in cable circuits had been the lack of good reliable amplifiers at reasonable cost. Jerrold appears to be able to modify some of its standard TV cable distribution amplifiers successfully, and Philco has shown interest in producing an amplifier built to the high standards that utilities require.

► Bill Leidigh of Portland General Electric Co. reports that their microwave system has been enlarged by the addition of a 30-mile hop from Mt. Scott near Portland to Saint Helens. The new leg ties in with their existing RCA two-gigacycle system and uses SSB multiplex.

WASHINGTON REPORT

Resources Planning Overhauled

A new emphasis on long-range coordinated resources planning is under way at the Interior Department. First step has been the redesignation of the department's old technical review staff as the Resources Program Staff by Interior Secretary Stewart Udall.

A new policy and program committee – similar to one that functioned briefly under former Secretary Oscar Chapman during the last two years of the Truman administration—will be set up later. Chapman's old committee failed to be effective, principally because of lack of support within the department. Reportedly, Chapman's group never had a formal agenda prepared for it.

Most of Udall's changes are based on a report prepared for Interior by Resources for the Future Inc., a Washington research firm. However, Udall has not accepted all of the RFF recommendations. Another study, which will guide the resources program staff, is being handled by Cal Tech Prof. Harrison Brown's committee on natural resources under the White House's Federal Council on Science and Technology. Brown is reviewing the type and effect of Federal Resource's research, rather than resources themselves. His study may not be printed as a formal report, but his findings will be applied to the fiscal 1963 budget message, due in January.

The new resources program staff will have about a dozen personnel, compared to the previous technical review staff's three or four. And the new group will have considerably more influence in coordinating and planning departmental resources activities. Actual resource research will continue in the various bureaus, Reclamation, Bonneville Power, etc., but coordination and long-range policy will be promoted by the new group.

The resources staff is headed by Charles Stoddard. A new science advisor, Roger Revell, formerly with the Scripps Oceanography office, Calif., has been added, and he will have a small staff under him. Revell's post was recommended by RFF, but a similar RFF proposal for an economics advisor won't be carried out. Economics data and planning will come from existing sources.

No details are available yet as to what the new Interior resources group may have in mind for power policies. RFF recommended that it study (1) specific resource industries, including their financing and structure; (2) regional economics problems; (3) long-range continuing resource demand and supply conditions; (4) other special reviews of resource economic problems.

In no way would the new resources group detract from present research being carried out at lower bureau levels. The RFF report, for example, praised the Bureau of Reclamation for the "excellent work that is being done" there but added, "it is significant that the Bureau of Reclamation, with a construction budget of over $200 million per annum, can invest only a few hundred thousand dollars in research."

The RFF report to Interior posed a challenging question: "Is it time that the nation once again re-assess all of its public policies relating to electric power in the light of . . . fundamental changes and their significance for national productivity and for the public interest generally; it has been 25 years since public attention was focused upon over-all national power policies."

"Fundamental changes" referred to above, according to RFF, are: (1) hydroelectric potential is becoming an even smaller fraction of the total electric power load; (2) advances in steam technology, along with load growth, have made hydro, provided by both regular and pumped storage, most valuable in serving peak loads in all regions except the Pacific Northwest and Alaska. This means that if the best use is to be made of federal hydro it must be integrated with steam power; (3) rapid changes in the technology of long-distance, high-voltage transmission has opened up new opportunities for marked advances in the economic efficiency of power supply.

The RFF added federal generation of hydro power and preference in its marketing through municipal, public and cooperative distribution facilities "is an important means of regulating rates and service of private power companies."

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- Ⓛ Type N
- Ⓜ Type NR

Reclosers

- Ⓝ Type 4H
- Ⓞ Type E
- Ⓟ Type 3H
- Ⓠ Type R
- Ⓡ Type RE
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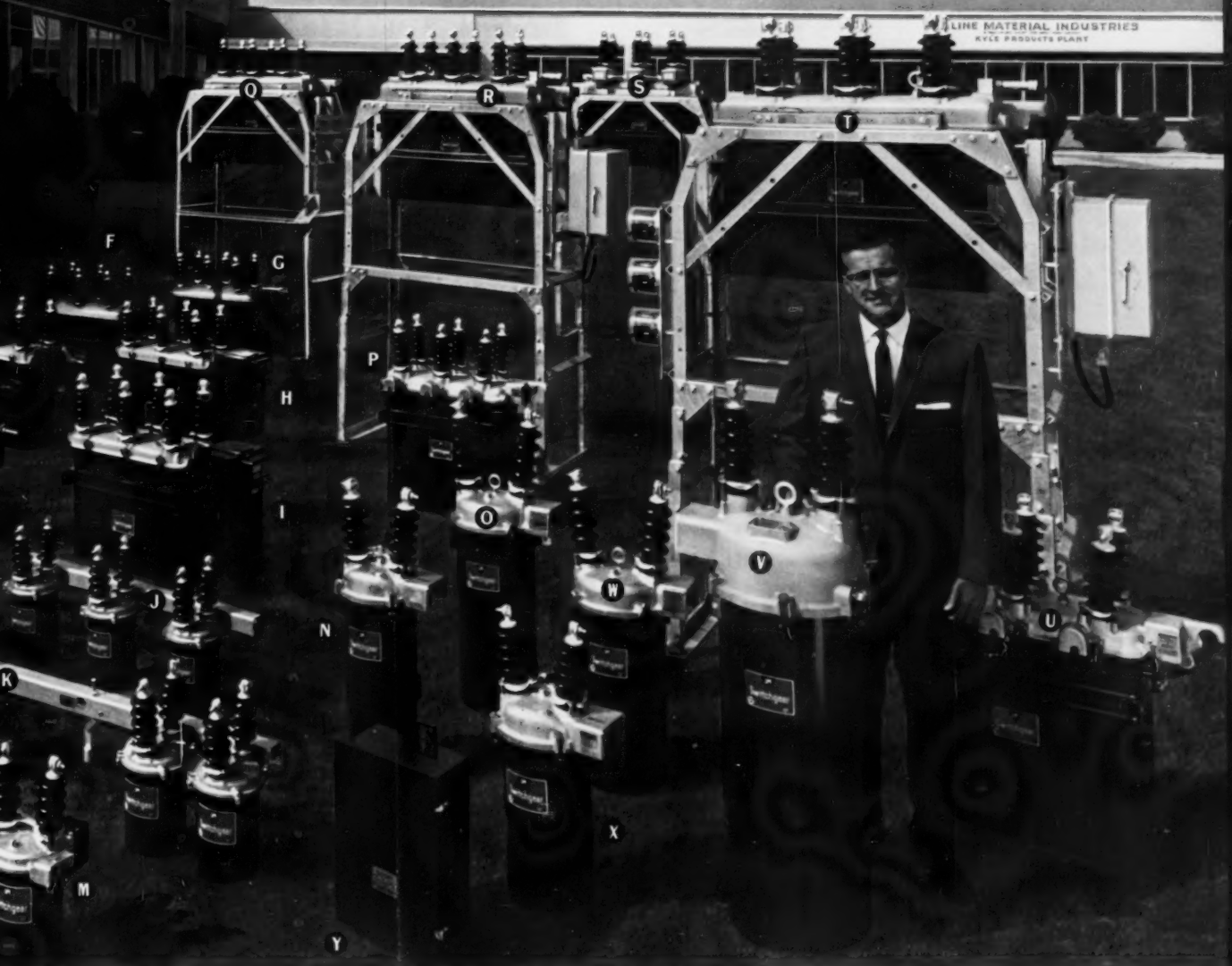
Announces The New TYPE D

Power Class III Single-Phase Recloser



Type D—another cost-saving addition to L-M's complete recloser line from L-M Research and Development.

Blaine Schultz, Manager of Engineering, Kyle Products, presents the new L-M Type D Single-Phase automatic oil circuit recloser. This is the latest product of L-M's continuing program of providing electric utilities with overall, low-cost system protection. Type D Power Class III reclosers provide protection against faults up to 12000 amperes.

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			POWER CLASS																
		95 KV BIL 2.4-14.4 KV	110 KV BIL 2.4-14.4 KV																
			Class I			Class II													Class
		Single-Phase Type H Three-Phase Type 3H	Single-Phase Type 4H Three-Phase Type 6H			Single-Phase Type L			Three-Phase Type R			Three-Phase Type RE			Single-Phase Type D			Three-Phase	
		2.4-14.4 KV	4.8 KV	8.32 KV	14.4 KV	4.8 KV	8.32 KV	14.4 KV	4.8 KV	8.32 KV	14.4 KV	4.8 KV	8.32 KV	14.4 KV	4.8 KV	8.32 KV	14.4 KV	4.8 KV	8.32 KV
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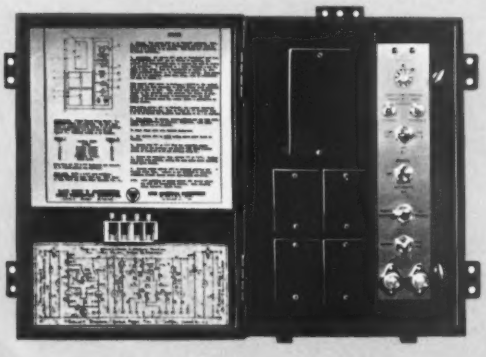
160	320								6000	5000	4000				9600	9600	8000	9600	960
185	370								6000	5000	4000				11100	10000	8000	11100	1000
200	400					6000	5000	4000				6000	5000	4000					
225	450								6000	5000	4000				12000	10000	8000	12000	1000
280	560					6000	5000	4000	6000	5000	4000	6000	5000	4000	12000	10000	8000	12000	1000
400	800								6000	5000	4000	6000	5000	4000	12000	10000	8000	12000	1000
400X	560								6000	5000	4000							12000	1000
560	1120														12000	10000	8000	12000	1000
560X	750																	12000	1000

2800 Oil Switches—A SWITCH FOR EVERY NEED

		2.4 KV THROUGH 7.2 KV											7.2 KV THROUGH 14.4 KV									
		95 KV BIL OIL SWITCHES				110 KV BIL OIL SWITCHES							95 KV BIL OIL SWITCHES				110 KV BIL OIL SWITCHES					
	% P.F.	N	NR	NM	NV	VH	VM	VR	VLH	VLM	VLR	VCR	N	NR	NM	NV	VH	VM	VR	VLH	VLM	VLR	VCR
50 AMPERES	10- 50 LAG	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
	50- 75 LAG	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
	75-100 LAG	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
	O-Lead	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x				x
100 AMPERES	10- 50 LAG								x	x	x									x	x	x	
	50- 75 LAG	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
	75-100 LAG	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
	O-Lead	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x				x
150 AMPERES	10- 50 LAG								x	x	x									x	x	x	
	50- 75 LAG					x	x	x	x	x	x									x	x	x	
	75-100 LAG	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
	O-Lead	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x				x
200 AMPERES	10- 50 LAG								x	x	x									x	x	x	
	50- 75 LAG					x	x	x	x	x	x									x	x	x	
	75-100 LAG	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
	O-Lead					x	x	x				x					x	x	x				x
300 AMPERES	10- 50 LAG								x	x	x									x	x	x	
	50- 75 LAG								x	x	x									x	x	x	
	75-100 LAG					x	x	x	x	x	x									x	x	x	
	O-Lead					x	x	x				x					x	x	x				x
400 AMPERES	10- 50 LAG								^	x	x									x	x	x	
	50- 75 LAG								x	x	x									x	x	x	
	75-100 LAG					x	x	x	x	x	x									x	x	x	



Over 2800 combinations of field and factory-installed accessories on the Type N and V line of oil switches serve a multitude of applications on 2.4 to 14.4 kv circuits. Manual, remote, or automatic control.

TYPE S CONTROL (LEFT) provides reliable automatic transfer of load from one source to another. Simplifies engineering of radial feed systems, when the Type S provides single or 3-phase control with L-M's Type NR, VR, or VLR automatic oil switches.

L-M'S L
system p
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Over 10
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variety

FERS YOU

						150 KV BIL 2.4-23 KV		
Class III								
Phase Type W		Three-Phase Type WE			Single-Phase Type E*			
8.32 KV	14.4 KV	4.8 KV	8.32 KV	14.4 KV	14.4 KV	23 KV		
					200	200		
					400	400		
					600	600		
					1000	1000		
					1400	1400		
					2000	2000		
					2500	2500		
6000	6000	6000	6000	6000	2500	2500		
8400	8000	8400	8400	8000				
9600	8000							
10000	8000							
			12000	10000	8000			
10000	8000							
10000	8000	12000	10000	8000				
10000	8000	12000	10000	8000				
10000	8000							
10000	8000	12000	10000	8000				
10000	8000							

*Electrical interconnection available to give three-phase lockout.

M'S LATEST CONTRIBUTIONS to low-cost tem protection. Type WE Power Class III ee-phase recloser with electronic control ar) offers maximum application flexibility with plicity in system coordination and field anges. New Type D is the only Power Class single-phase recloser on the market.

●

ver 10,000 optional operational characteris-s are available to provide the widest selec-n of reclosers today. Low-cost protection is fered in 11 different types of reclosers with a riety in voltage, class, and amperage rating.

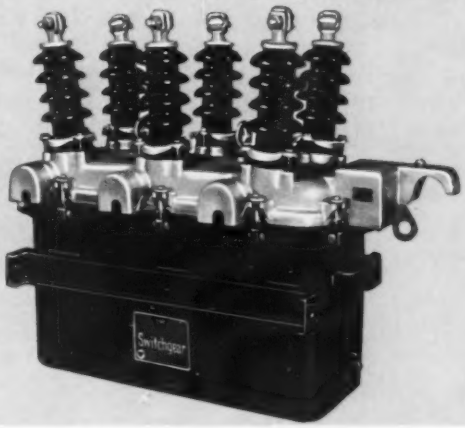
36 Sectionalizers—CURRENT RATINGS

COIL CONTINUOUS RATING—AMPERES	LOAD SWITCHING RATING—AMPERES	ACTUATING CURRENT RATING—AMPERES	SHORT TIME RATING—RMS ASYMMETRICAL AMPERES					
			95 KV BIL 2.4—14.4 KV			110 KV BIL 2.4—14.4 KV		
			SINGLE-PHASE TYPE GH			THREE-PHASE TYPE GN3		
			MOMENTARY & MAKING	1 SEC.	10 SEC.	MOMENTARY & MAKING	1 SEC.	10 SEC.
5	11	8	800	200	60	800	200	60
10	22	16	1600	400	125	1600	400	125
15	33	24	2400	600	190	2400	600	190
25	55	40	4000	1000	325	4000	1000	325
35	77	56	6000	1500	450	6000	1500	450
50	110	80	6500	2000	650	7000	2000	650
70	144	112	6500	3000	900	8000	3000	900
100	200	160	6500	4000	1250	8000	4000	1250
140	200	225	6500	4000	1800	8000	4000	1800
160	200	256				9000	5700	2600
185	200	296				9000	5700	2600
200	200	320				9000	5700	2600

36 combinations of trip ratings and counting options make L-M's GH single-phase or GN3 three-phase sectionalizers a most economical method for automatically isolating permanent faults on 2.4 to 15 kv distribution branch circuits, when applied in conjunction with a back-up recloser.

●

L-M'S TYPE GN3 (RIGHT) is the most recent development in sectionalizers. Only three-phase sectionalizer available today.



L-M Switchgear Provides Lower Overall System Costs

Application of Line Material reclosers throughout your system offers savings in many ways. Lower purchase costs, and lower installing cost cut your initial investment. Lower operating costs and reduced maintenance provide long range savings.

Lower Initial Cost

Application of L-M reclosers as the automatic disconnecting device throughout your distribution system eliminates the initial high costs of circuit breakers and associated relaying equipment. Less land is needed. Installation labor is cut about 50%.

Lower Operating Costs

L-M reclosers detect and interrupt fault currents and automatically reclose. This effectively reduces the outage time caused by transient or non-persistent faults. Fast operating characteristics of reclosers, less than 2 cycles, minimize annealing or burn-down of bare or covered conductors and increase service continuity, because over 90% of all faults are of a temporary nature.

Get Complete Information

Ask your Field Engineer for more information on how L-M switchgear can be profitably applied to your system. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: CLM Industries, McGraw-Edison (Canada) Limited, Toronto 13, Canada.

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

Reclosers, Sectionalizers, and Oil Switches

DISTRIBUTION TRANSFORMERS · RECLOSERS, SECTIONALIZERS AND OIL SWITCHES
FUSE CUTOUTS AND FUSE LINKS · LIGHTNING ARRESTERS · POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS · CAPACITORS · REGULATORS · OUTDOOR LIGHTING
LINE CONSTRUCTION MATERIALS · PORCELAIN INSULATORS · FIBRE PIPE AND CONDUIT

GROWTH

Sultan Progress

Construction is under way on the Sultan project in Snohomish County, Wash., which will function as a source of domestic water supply for the city of Everett as well as a source of power for PUD No. 1 of Snohomish County.

Clearing work on access roads to the dam site is one-third complete. These roads are being constructed approximately three miles through mountainous terrain. The contract for grubbing and clearing approximately 300 acres in the reservoir area was awarded Oct. 2, 1961. The completion date of both jobs is set for early in the summer of 1962.

The design work on the concrete arch dam is under way and it is expected construction will start in the spring of 1962.

The project when completed will consist of three dams, three power houses and associated tunnels, conduits and transmission lines. Dam No. 1, a concrete arch dam 242 ft high, located approximately 17 miles above the confluence of the Sultan and Skykomish Rivers, will impound approximately 100,000 acre-ft of usable storage. This dam will be connected by a tunnel approximately 3,000 ft long to a downstream power house containing two 42,000-kw generating units. Water released from this power house will discharge directly into the reservoir behind dam No. 2, a rockfill structure 190 ft high, from which a tunnel approximately 11,500 ft long will extend to a power house containing two 16,000-kw generating units. This power house will discharge water directly into the pool behind the existing diversion dam, owned by the city of Everett, which diverts water from the Sultan River to Lake Chaplain. The height of the diversion dam will be increased approximately 8,800 ft long and will be constructed to carry the additional water diverted to Lake Chaplain.

The Lake Chaplain reservoir has a total storage capacity of 16,000 acre-ft of which approximately 5,000 acre-ft are proposed to be used for hydroelectric purposes. Water released from Lake Chaplain will be carried by an asphalt-lined canal to a third power house to be located on the Sultan River approximately two miles below the outlet from Lake Chaplain. One 24,000-kw generating unit will be installed in this power house.

The total installed capacity of the three power houses will be 140,000 kw. The project is designed to carry peak loads on the district's system in coordination with purchases of power from the Bonneville Power Administration and others. In addition to providing a substantial block of power to the district there will also be made available to Everett and Snohomish County 330 million gallons of water daily for domestic, commercial and industrial use.

Plans call for the construction of the project in two steps. The first step, which is now under way, covers construction of access roads, clearing and grubbing the reservoir area and the main storage dam to a height of 140 ft. This will provide approximately 20,000 acre-ft of usable storage. This storage, together with the city's present storage in Lake Chaplain, will make available a total of approximately 170 million gallons of water daily.

The construction of the second step will be when the electric load grows to such an extent that the power to be developed by the project can be advantageously and economically absorbed in the district's electric power load, which is expected to be at least another ten years.

The project is being developed jointly by PUD No. 1 of Snohomish County and the city of Everett and is being designed by R. W. Beck & Associates, analytical and consulting engineers, Seattle, Wash.

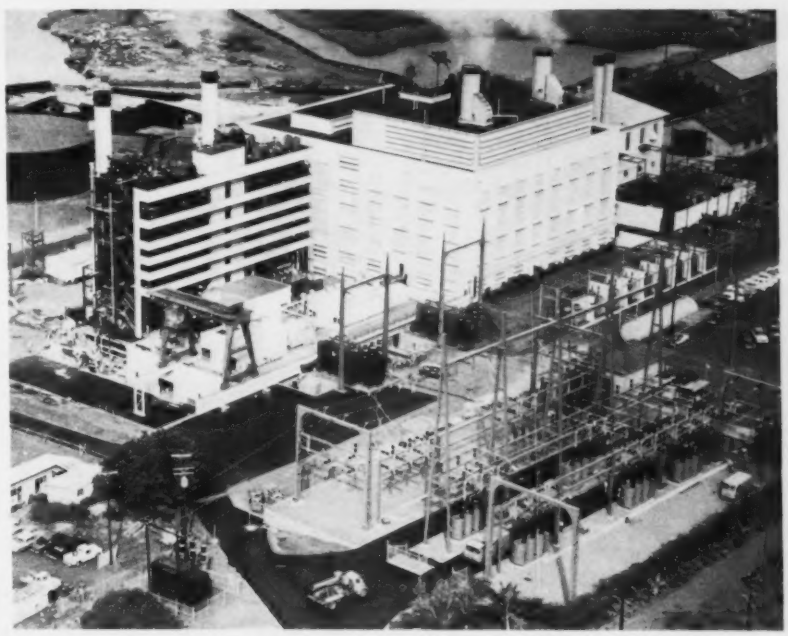
Boise-American Falls Tie

Idaho Power Co.'s second 230,000-v transmission tie between the east and west ends of its interconnected system began service recently as electricity flowed for the first time through a new $7,700,000 line extending 190 miles from Boise to American Falls.

The high-voltage carrier—longest wood pole line in the U. S. equipped with new style "bundled" conductors—was energized with the closing of a switch at the utility's Boise bench substation.

The line's bundled conductors, used by Idaho Power for the first time, are an advance in high-voltage transmission techniques that will enable the utility to deliver 40% more electricity through the new carrier than through lines with standard conductors.

Designed to increase the general



Shown above, left, is the new unit No. 6, which Hawaiian Electric Co. recently put into operation at its Waiau plant near Pearl Harbor. The generator is the second in the addition that joins the utility's older, enclosed plant. Construction began in July 1960 and this unit, like its companion unit No. 5, has a rated capability of 50,000 kw. Waiau No. 6 was designed under the management of Carl H. Williams, manager of engineering, Hawaiian Electric Co., and installed by Hawaiian Bechtel, a joint venture between Hawaiian Dredging & Construction Co. and the Bechtel Corp.

efficiency of transmission, the conductors consist of two paired cables for each of the line's three phases, instead of the three single cables normally used.

J. F. Emery, Idaho Power vice president and assistant general manager, said the new line also gives Idaho Power an additional high-voltage transmission connection with Utah Power & Light Co. for the mutually helpful exchange of electricity between the two systems.

Big Eddy Line

Bonneville Power Administration's $6,700,000 Big Eddy-McLoughlin 230-345-kv line was energized recently.

Portland General Electric Co. terminal facilities at McLoughlin substation and 230-kv transmission lines from McLoughlin sub (near Oregon City) to Gresham and to Bethel (near Salem) were energized simultaneously. The PGE facilities were built at a cost of $1,125,000.

The 80-mile Big Eddy-McLoughlin line originates at BPA's Big Eddy substation near The Dalles, Ore. Constructed for 345-kv transmission, it will operate initially at 230 kv.

The PGE facilities interconnect with BPA's 230-kv Santiam-Chemawa line at the Bethel sub near Salem and with Pacific Power & Light Co.'s Portland grid at Linneman substation near Gresham.

Prime contractors for the BPA line were Charles T. Parker Construction Co., Portland, and the Key Construction Co., Tacoma, Wash. Murray Brothers Construction Co., Bend, Ore., contracted the right-of-way clearing.

BPA Lines

Two new Bonneville Power Administration transmission lines connecting Columbia River dams in eastern Washington with load centers in the Puget Sound area will be energized in November, BPA officials said at Wenatchee, Wash.

One is a 129-mile, 345-kv Rocky Reach-Maple Valley line to deliver power from the Chelan PUD's Rocky Reach Dam to the Maple substation near Renton, Wash., for Seattle City Light and Puget Sound Power & Light Co.

The other is the 127-mile, 287-kv Tacoma-Covington-Columbia line to deliver power from Grand Coulee Dam to Tacoma City Light. The line interconnects with Grand Coulee lines at Columbia substation near Wenatchee.

MARKET DEVELOPMENT

A gold Medallion certificate is presented to Vernon L. Lenox, Student Body president, San Diego City College, by R. J. Phillips, vice president, sales, San Diego Gas & Electric Co., while Norman A. Dreher, electrical wiring instructor, and Joseph H. Stephenson, dean of technical education at the college look on. The students were responsible for an all-electric model project, which qualified for the certificate

Future Electricians Learn Through Model Home Project

Model home projects by industrial art classes in high schools and junior colleges can be excellent vehicles for promoting electric living, recent experience of San Diego Gas & Electric has shown.

As told by Jack Hacker of the utility's residential wiring and lighting staff, such a model home project was initiated by San Diego City College's pre-employment electrical wiring class, headed by Norman A. Dreher, electrical and wiring instructor, and assisted by Robert Moorhouse, carpentry instructor.

Having secured the approval of the Board of Education and school officials, the group still needed a recognized organization who would accept the responsibility for carrying out such an ambitious project. The Associated Students took on this duty with a two-fold purpose: to get revenue from sale of the house and to gain prestige from sponsoring the project.

Because he wanted features that would sell the house in a competitive market, Moorhouse sought the utility's help in meeting Certified AW and Light for Living requirements. He asked advice on wiring and lighting a 1,240-sq-ft house. The layout made by the utility was the pattern for the students, who completed final electrical drawings and incorporated additional upgraded electrical standards into the specifications.

For easy removal, the all-electric home was built on a temporary foundation and framework. Upon completion it was put on public view and was to be sold to the highest bidder, who must provide his own lot.

The home cost $11,250 to build including all the extras (minimum cost without extras would have been $7,600). Some of the items, such as scaffolding material and fence can be used in future projects. An offer of $11,950 has been made.

A leading banking firm appraised the house at $18,500, sitting on an average city lot, plus between $3,500 and $5,000 for the lot. On the city school property, it was appraised at $13,500.

The enthusiasm and interest of the students doing the electrical work was most gratifying, Hacker reports. They took a great deal of pride in workmanship and were pleased to see the final results (when the electrical system was checked out everything worked).

Exposure of these young men to the electrical advantages obtained through adequate planning is invalu-

able, Hacker believes. This use of model home projects to educate tomorrow's electrical tradesmen in the economical use of modern techniques and materials to build a quality home will pay three-way dividends—to the students, electrical people and the shelter industry, he said.

"Best for You in '62"

In a conference that began at 1:30 p.m. and continued through dinner and into the evening, the general sales division of the Los Angeles Department of Water & Power outlined goals for the future, reviewed the past year's achievements, and introduced a new battle cry: "All Electric —Best for You in '62!"

The meeting, held at the Glen-Aire Country Club in the San Fernando Valley, was the first such extensive event to be conducted by the division for its employees.

Opening session was a general rally of all the department's general sales personnel, with Sales Manager Robert H. Cockfield delivering the introductory talk. After outlining sales goals and objectives for the coming year, Cockfield introduced his section sales managers, who detailed plans for the year.

Late afternoon group meetings were devoted to reviews of progress, plans for expanding current activities, and discussions of new sales techniques, keyed to the particular sales areas of the individual sections.

Los Angeles' newly appointed Board of Water & Power Commissioners and top management executives of the department were invited to participate in the evening session. Speakers were Bradley Cozzens, DWP assistant chief electrical engineer, who talked on "A Manager Looks at His Sales Operation," and Dr. W. Ballentine Henley, chairman of the personnel committee of the Board of Water & Power Commissioners.

Frank J. MacLaughlin (holding trophy) was selected by Sales Manager Robert H. Cockfield (on stage left) as winner of a special general sales achievement award. MacLaughlin had already been honored as Commercial Salesman of the Year. At table below stage level are (left to right): Samuel L. Friedman, director of public relations, Mrs. Friedman and Water & Power Commissioner Frank R. Palmieri

WWP home economists Peggy Lewis and Dorothy Smith (far right) get ready to award one of the door prizes at the utility sponsored Home Economics Workshop in Spokane. On stage for the afternoon session is the panel for the Pushbutton Laundry Forum, including, from left: Mary Kelly, Philco; Beth Peterson, duPont; E. Arlean Pattison, extension home management specialist, Washington State University, the moderator; Mrs. Robert M. Brown, homemaker; Elvira Partida, textile specialist, WSU

Back to Envelopes

Pacific Power & Light Co. has dropped postcard billing after a two-year period.

Decision to return to envelope billing followed careful appraisals of the value of stuffers in restoring customer contacts and giving specific sales and service information, according to R. K. Foley, advertising manager.

The move in November was keyed to the first issue of an eight-page customer publication entitled "Pacific Powerland" produced by the PP&L advertising department staff. It features brief, well-illustrated stories of the company's activities, tax information, company personnel, customers, and products and attractions of PP&L's service territory.

Pacific Power turned to punch-card bills about two years ago after installation of electronic data processing equipment.

Workshop Draws 200

More than 200 home economics teachers, extension agents and homemakers attended "High Buttons to Push Buttons," a home economics workshop sponsored by Washington Water Power Co. in the Spokane Auditorium, Oct. 14.

The program was devoted entirely to laundering, uses of equipment and fabric care.

Participating were Beth Peterson, home economist for E. I. du Pont de Nemours & Co.; Mary Kelly, regional home economist, Philco Corp.; Sylvia White, director of consumer products, Waste King-Universal; Miss E. A. Pattison, extension home management specialist, Washington State University, and Elvira Partida, textile specialist, WSU.

WWP started its home economics workshop program last year. The first session drew attendance from Washington, Idaho, Montana and Oregon.

► An electric heat promotion sponsored by Inland Empire Electrical League netted **443 new electric heat** customers for Washington Water Power Co., it was reported by George Gough, league manager. Total connected load in the new installations is 6,013 kw. Incentive prize was a five-day elk hunting trip in northern Idaho. Winners were Don McGrady, Rod's Electric, Spokane; Stanley Kopczynski, Cottonwood, Idaho; Ray Killon, Pullman, Wash., contractors; Earl Davenport, WWP salesman.

PEOPLE

PG&E Appointments

Three executive appointments in the Pacific Gas & Electric Co. organization were announced recently by S. L. Sibley, vice president and general manager.

Frank G. Rothganger was appointed manager of commercial, industrial and agricultural sales. William O. Cheney succeeds Rothganger as chief of the department of engineering research. He will head the company's laboratory in Emeryville, where materials quality standards are established. Gordon V. Richards of Berkeley was made supervising civil engineer at the laboratory.

Rothganger

Rothganger, who will move to the company's San Francisco general office, has been in charge of the engineering research department since 1956. He joined PG&E in 1925 after graduation from the University of California as an electrical engineer.

Cheney was employed as an assistant engineer in 1947. He has been supervising mechanical engineer at Emeryville since 1958, where he has specialized in the development of protective devices for fish conservation at power plants. He holds a patent on a type of fish screen utilizing an air bubble curtain.

Graduated from the University of California with honors in 1937, Richards earned the master of science degree in 1939 and served on the faculty as an instructor in engineering. In 1946 he joined PG&E's engineering department.

► **Chris A. Klawa,** chief electrical safety engineer now for the Bureau of Labor, State of Oregon, was recently named a member of the Electrical Council of Underwriters' Laboratories, succeeding to the place of W. R. Volheye, retired, whom he succeeded for Oregon's Bureau of Labor.

► **Kirby Billingsley,** manager of the Chelan PUD, was named state industrialist for 1961 at the annual convention of the Washington Assn. of Realtors in Seattle. In presenting the award, Senator Warren G. Magnuson cited Billingsley's leadership in the development of the Rocky Reach project.

► **E. R. Peck,** personnel services chief for B. C. Power Commission at Victoria, has been given leave of absence to serve with the Central Electricity Generation Board in England. **Dr. Hugh L. Keenleyside,** chairman of the power commission, will take over his duties.

► **Clifford Tyler,** commercial director for Seattle City Light, has been appointed to the State Power Advisory Committee by Governor Robert D. Rossellini at Olympia, Wash. Tyler succeeds J. D. Barline of Tacoma, who died recently.

► Pacific Power & Light Co. has transferred **Lea Phillips** from Portland headquarters to the Wyoming Division as assistant to Veryl N. Hoover, vice president and division manager. While in Portland, Phillips was administrative assistant to Paul B. McKee, chairman of the board. He was active in Portland community affairs.

Phillips

► **Walter J. Herz** was elected assistant secretary of Sierra Pacific Power Co. Except for three years in G-E's aircraft instrument engineering department, he has been with the power company since 1929. Herz is presently assistant chief engineer. Previously he was supervisor of the commercial and sales department. For 23 years he worked with Dr. J. E. Church, who developed the snow survey methods used to forecast water reserves in the Sierra, making snow surveys each winter.

Herz

► **Robert F. Wade** has been named general manager of the Fairbanks, Alaska, municipal electric system. He was formerly superintendent of the Jasper, Ind., utility service board.

► **William M. Hamilton,** who retired in 1947 as Portland General Electric Co.'s Salem division manager, has retired a second time at age 80. Since his first retirement at 65 he has supervised the construction of several major projects, including Salem's Capitol Shopping Center which he has been serving as custodian. Following this second retirement, he plans to be available as a consulting engineer.

► **Philip G. Humphreys,** power production superintendent for California Oregon Power Co. for nine years and of the Copco Division of Pacific Power & Light Co. since merger into PP&L in June, has been named superintendent of power production for the entire PP&L system in six states. A veteran of 27 years with the utility industry in southern Oregon, Humphreys already has assumed responsibility for PP&L's 40 hydroelectric and eight steam-electric generating plants. He succeeds **L. A. Morphey,** veteran power chief for PP&L, who retires later this year.

Humphreys

► **Frank N. Savage** retired as manager of the Blachly-Lane County Cooperative Electric Assn. at Eugene, Ore., and has been succeeded by **Dale C. Swancutt.** Savage had been with the co-op for 23 years. Swancutt moved to his new duties from North Bend, Wash., where he had headed Tanner Electric Co.

► **Al Natalie,** lighting specialist for Pacific Power & Light Co. in the Portland district, has been elected chairman of the Oregon Section of the Illuminating Engineering Society. Other new officers, who will begin one-year terms in September, include R. S. Wickham, street lighting consultant for Portland General Electric Co., vice chairman; and James E. Beck, lighting sales director, Pacific Power & Light, secretary-treasurer.

Natalie

► **Robert N. Crichton** has been appointed city engineer at Seaside, Ore. He formerly was in Hood River as city engineer and earlier was with the U. S. Corps of Engineers and with Minneapolis-Honeywell.

Organization Changes At B. C. Electric

New appointments have been announced by Dr. Gordon Shrum, chairman of the B. C. Electric, following government's takeover of the utility.

W. H. Q. Cameron, formerly mainland solicitor for the company, has been named manager of the legal department and general solicitor, replacing D. M. M. Goldie, resigned.

Robert W. Gross, formerly senior solicitor, has been named manager of the newly formed lands division.

Mark C. Trueman, operations manager of the Vancouver Island division, becomes Vancouver Island manager, succeeding William Mearns, who was named a director and vice president by the government when it took over the company.

Richard M. Bibbs will be manager of the Peace River hydroelectric project. F. J. N. Noble will have responsibility for Peace River engineering and construction. J. S. Don will be project labor relations officer for the project, which will have a separate office on the 13th floor of the B. C. Electric building in Vancouver.

John Wilson Gouge has been named executive assistant to Dr. Shrum. He formerly was engineer-economist with the B. C. Research Council and also did work for the B. C. Energy Board.

R. G. Scott, who was general sales manager for the private utility, has been made general manager, marketing division, for the government operation, succeeding E. Douglas Sutcliffe, who resigned.

► **Robert E. Brown** will be project manager for Seattle's Boundary hydroelectric plant, recently licensed by FPC. Resident manager of the Karadj Dam project in Iran for the past three years, Brown previously had been resident engineer at Seattle City Light's Skagit project.

Brown

He started as an inspector in June 1949 and was promoted to senior inspector in 1950, assistant resident engineer in 1952 and resident engineer in 1954.

► **A. F. Darland,** power supervisor at Grand Coulee Dam, retired Oct. 1 after 27 years with the USBR. His post has been taken over by **Erick A. Benson,** who has been serving as associate power supervisor. Darland served as the principal field assistant to the project construction engineer of Grand Coulee Dam and, except for a brief period with Tacoma City Light after World War II, has spent his entire career in federal service.

PGE Promotions

Four executive promotions were announced by Portland General Electric Co.

W. K. "Ken" Davis, formerly assistant to Vice President Hilbert S. Johnson, has been appointed fleet supervisor. Donald T. Shattuck will take over his former duties and will be succeeded as Beaverton district manager by Kevin T. Cadigan. Marvin S. Prestwood will be moved from the Portland office to Sandy to take Cadigan's place as manager there.

► **Jack D. Schwartz,** a former Washington State legislator and gas utility executive, has moved to Yakima as assistant to D. B. Leonard, Washington division manager for Pacific Power & Light Co. For the past five years he had been assistant director of public relations for Washington Natural Gas Co. He took up his new duties on Oct. 1.

Schwartz

► **Wilbur Lee,** supervisor of Washington Water Power Co.'s Clarkston office, has been promoted to district manager at Tekoa, succeeding **Boyd Fink,** who retired Oct. 1. **Ambrose Glidden** has been moved from the Lewiston office to succeed Lee.

► **Abe Hoss,** Portland General Electric's area development manager, has been elected president of the Pacific Northwest Industrial Development Council.

► Washington Water Power Co. has transferred **L. A. Winn** to Spokane as assistant division manager. His former post, as Big Bend division manager, has been taken over by **Donald L. Olson,** who has been division plant superintendent at Davenport.

► **Monte Brethauer,** formerly with Westinghouse Electric Corp., has joined Pacific Power & Light Co. as residential salesman in the central Oregon district.

Deaths

► **Gale C. Larkin,** 71, retired vice president and general counsel for Southern California Edison Co., died in Los Angeles Nov. 1. He joined Edison as an attorney in 1922 and retired as senior counsel in 1955.

► **H. H. Schoolfield,** 85, retired chief engineer of Pacific Power & Light Co., died Oct. 29 in a Portland hospital. He was active in the early years of NELPA, was a fellow of AIEE and a member of the Electric Club of Oregon. He served as PP&L chief engineer from 1917 until his retirement in 1949.

► **S. K. Gryde,** 70, died at his home in Whittier, Calif., Oct. 22. He was president of Standard Wholesale Electric until his retirement two years ago.

► **William S. Anderson,** retired president of Home Electric Co. in Tacoma, died Nov. 5 at age 84.

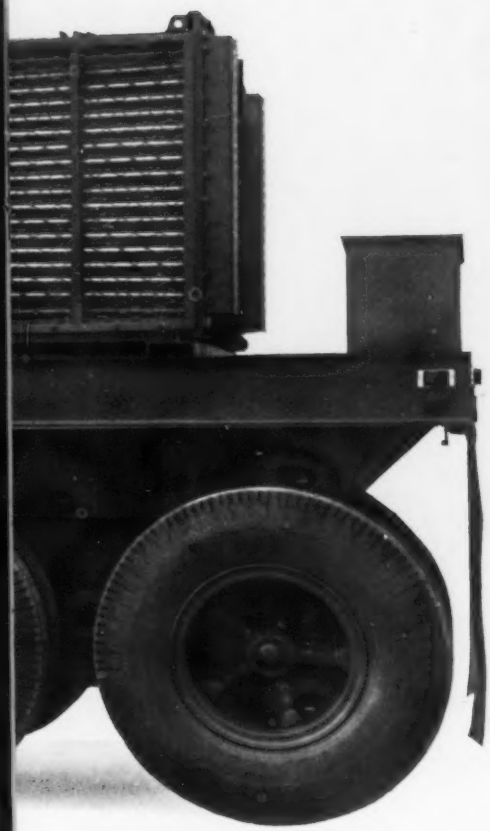
► **Meryl E. Mentzer,** 65, field representative for Rocky Mountain Electrical League, died in St. Luke's Hospital at Denver on Nov. 8. He suffered a heart attack last March but returned to work and was active at the recent RMEL convention in the Tetons. Mr. Mentzer was born in Cedar Rapids, Iowa, and moved to Denver in 1904. He served in World War I with Motor Transportation Corps, U. S. Army.

► **Burch C. White,** president of White Electric Co., one of Berkeley's pioneer electrical contractor-dealer establishments, died Aug. 16, in that city, aged 80. His son, Burch White Jr., is continuing the business.

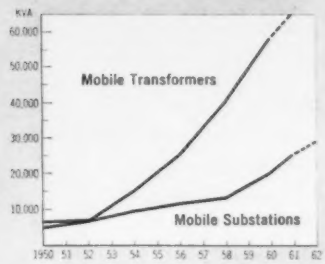
► **Lloyd Nash Robinson,** 71-year-old Seattle electrical engineer, died at his home in Seattle where he had lived for 26 years. He was a fellow of the AIEE and a member of Delta Upsilon and Sigma Xi fraternities.

► **George E. Kimball,** retired in 1948 as electrical engineer for the California Industrial Accident Commission, died recently, in San Francisco, after an extended period of disability from strokes, aged 79. In the 1920s he began his career in California as an engineer for the California Railroad Commission, then later became engineer for the accident commission, now known as Department of Industrial Safety. Always active in the International Association of Electrical Inspectors, he was a founder member of its predecessor California association.

MORE AND MORE KVA ON WHEELS



INCREASE IN G-E MOBILE UNIT KVA



RATINGS OF TYPICAL G-E MOBILE UNITS

Mobile Transformers	Mobile Substations
20,000 kva, 69 kv	15,000 kva, 132 kv
*20,000 kva, 115 kv	17,000 kva, 115 kv
*22,000 kva, 115 kv	*20,000 kva, 34.5 kv
25,000 kva, 115 kv	20,000 kva, 110 kv
25,000 kva, 138 kv	20,000 kva, 115 kv
*40,000 kva, 230 kv	22,000 kva, 69 kv
57,000 kva, 230 kv	25,000 kva, 138 kv

*autotransformers

100,000 kva on wheels? It may well be possible—*soon.* Pioneering design innovations by General Electric are pushing the limits of mobile capacity far beyond those envisioned only a few years ago.

Mobile substations rated as high as 25,000 kva and mobile transformers up to 57,000 kva are already in service or on order from General Electric . . . and even larger units are yet to come.

This progress means you can now multiply the economies of mobile units by extending their application to include even the larger substations on your system. Behind this ever-increasing capacity are such major G-E advances as these:

• **75C operation,** permitting 25 percent more capacity than the conventional 55C operation. Thermally superior Permalex® transformer insulation permits operation at the higher winding temperatures with normal transformer life expectancy.

• **Reduced insulation levels** (BIL) permit even more dramatic gains. For instance, a two-step reduction in high-voltage BIL of a 138-kv unit means up to *67 percent greater capacity,* with no increase in size or weight.

• **New lightweight internal switch** saves as much as 3500 pounds in over-all weight, increasing available capacity.

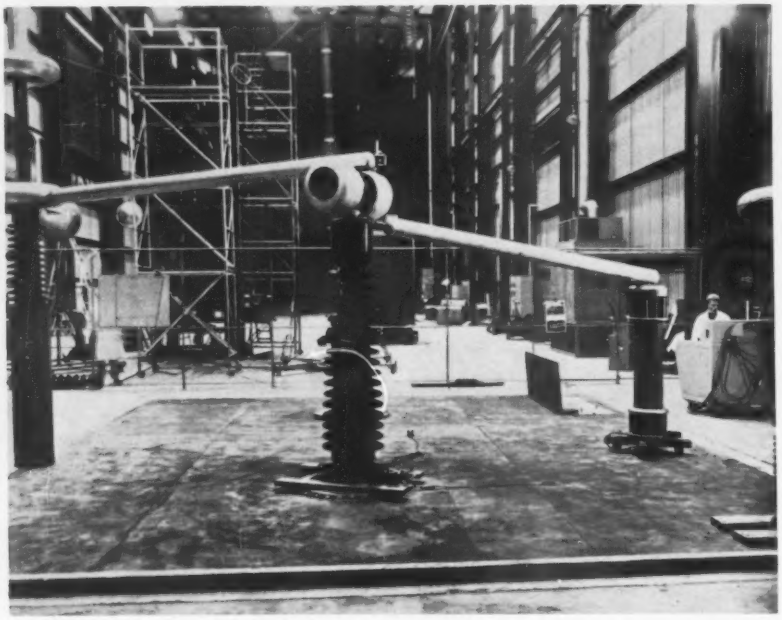
Through such innovations, General Electric continues to lead the industry in providing more and more mobile kva per pound on the road to match your growing loads. For full information on high-capacity mobile substations and transformers, contact your G-E Sales Engineer. Or, write General Electric Co., Section 422-45, Schenectady 5, N. Y. *Power Transformer Dept., Pittsfield, Mass.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

For phone number of closest representative see advertising index in back of book.

MANUFACTURERS AND DISTRIBUTORS



FPE's Santa Clara plant is used for research, product development work and for testing production units. Shown here is a 230-kv bushing receiving power factor check on Schering Bridge. Low voltage balancing circuits are in Faraday cage below. Tower at rear left is a 2,000,000-v impulse generator

High Voltage Lab

Federal Pacific Electric's high voltage laboratory is now in full operation at the company's new 226,000-sq-ft plant in Santa Clara, Calif. According to Leonard P. Shelley, FPE vice president and manager of its Western Manufacturing Group, the facility is the largest in the West devoted to manufacture and development of high voltage distribution and control equipment.

It incorporates a substantial investment in new production and testing equipment in addition to facilities previously located in four northern California plants. Shelley said that although floor space has been reduced by 20%, the new plant can handle 20% more volume than the five old units.

Power circuit breakers, HV switching equipment and transformers will be manufactured at the plant.

► Johns-Manville has appointed **William J. Scott** as Seattle district manager for distributor sales. He succeeds **C. J. Rossio,** who is being transferred to the Los Angeles district as a special representative for the Industrial Insulations Division. Scott has been sales representative for the Pipe Division in the Los Angeles territory. Previously he was with G-E Supply and with Atlas Brass Foundry.

► **Burndy is** putting seven display trailers on the road to demonstrate a range of products developed by its Utility-Industrial Division. A featured product is the new Cabelok Crimpit compression connector, which is shown in a large mock-up in the central panel on the trucks.

► **Louis J. Geiger** has been appointed manager of marketing for General Electric's Process Computer Section at Phoenix. He comes from Salem, Va., where he has been manager of starter and accessories sales for the company's industry control department.

► **Lou Ridgeway** has set up his own manufacturers representative business at 1901 4th Ave., San Diego 1. He also has offices in Phoenix and Pasadena. He was formerly with Sylvania Electric Products.

► **A. L. Lockwood** has been appointed vice president and Western Division general manager for Republic Appliance Division of Republic-Transcon Industries. The announcement was made by Milton J. Stevens, board chairman, who also named **Robert Blumenfeld** and **Vincent Horncastle** as district managers for the division.

► **Gordon S. Copeland,** formerly vice president of Republic-Transcon at Los Angeles, has been named president of Fowler Mfg. Co. of Portland. Acquired by Republic-Transcon in 1958, Fowler is one of the West's largest manufacturers of glass-lined electric and gas water heaters.

► **Charles J. Rossio** will handle sales of Johns-Manville fiber glass textile products in southern California. Headquarters are at the Los Angeles office, 611 S. Catalina St. Rossio has been in J-M industrial products sales since 1936 and most recently was Seattle district sales manager for the pipe division.

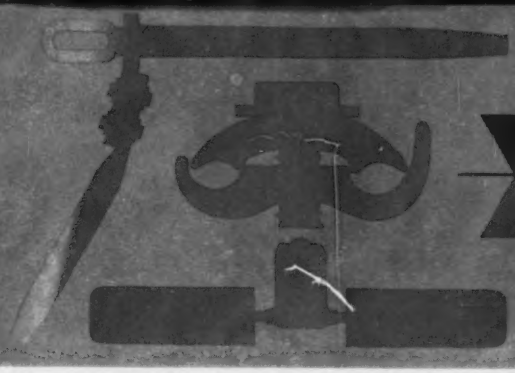
► **W. H. Pounder,** founder of **Pounder Electric** at Wenatchee, Wash., has announced his retirement and sale of the firm to **Raymond H. Gibbs.** Gibbs, who has been with Pounder for about 15 years, said that Fred Gibson will be manager under the new operation. The firm specializes in custom commercial electric installations and fruit packing plant electrical equipment.

► **Fluor Corp.** has acquired a minority interest in **William J. Moran Co.** of Los Angeles. Moran has been in the commercial and industrial engineering and construction business since 1865 and recently has become active in major urban redevelopment projects.

► **Allis-Chalmers** has named new Industries Group distributors in the West. They include **Fred E. Barnett Co.,** 3541 Highway 99 S., Redding, Calif.; **Searle Electric,** 1063 Forge St., Salinas, Calif.; and **Cooper Electric,** 1211 Wyoming Ave., El Paso, Tex.

► **Globe Illumination Co.** has started construction of a 100,000-sq-ft plant in Gardena, Calif. Scheduled for occupancy next February, the plant will cost upward of $1 million, according to Max Rosenblatt, president of the fluorescent lighting equipment firm. The six-acre site is at 1515 W. 178th St.

► **Simonsen Metal Products Co.** of Chicago is adding a line of electrical enclosures and is appointing representation in the West. Simonsen is represented in the San Francisco Bay area by **Garrison & Co.**



ALCOA ALUMINUM
ACCESSORIES ROUNDUP

Announcing ALNOX

. . . a new joint compound designed with the connection in mind

ALNOX has exceptional electrical qualities. It protects the good joint it helps make by excluding moisture. Even in pelting rain it adheres and does not wash away. ALNOX is Alcoa's *newest* electrical joint compound.

ALNOX is a compound containing extremely hard, conductive particles. It has the optimum combination of electrical characteristics and corrosion resistance. It does a superb job over a full range of temperatures.

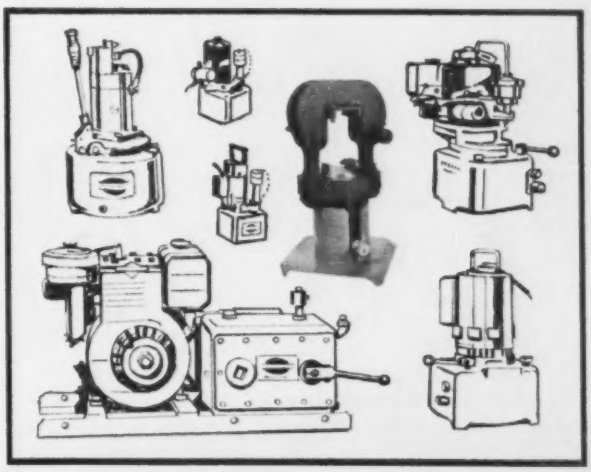
ALNOX's melting point is above 550°F—won't melt or run during high-temperature operating conditions. Under conditions of extreme cold, it remains pliable for easy installation.

ALNOX is available now, packaged in an easy-to-use plastic squeeze tube—especially designed for the convenience of the lineman.

Why 10,000 psi?

Every pump pictured here is capable of delivering 10,000 psi. That's why we have standardized on this pressure for *all* of our compressors. It means you can use any of the pumps shown, as well as many not included in this picture. It means that the same pumps used for conduit benders and punches can be used with Alcoa compressors. It means complete interchangeability for hose and fittings.

It adds up to this: Use 10,000 psi for *versatility* and *interchangeability* of your equipment. Another good reason for standardizing on Alcoa when it comes to accessories and equipment!



(Continued on next page)

Alcoa service entrance connectors now available in 5/8" size

CONDUCTOR SIZE						Wt. in Lbs. Per 100 Pieces	Cat. No.
"B" END			"C" END				
ACSR	AWG	Color Code	ACSR	AWG	Color Code		
1/0-6/1	1/0 Str.	Yellow	1/0-6/1	1/0 Str.	Yellow	4.9	1367
			2-7/1 2-6/1	2 Str.	Red	4.9	1366
			4-7/1 4-6/1	4 Str. 2 Sol.	Orange	5.0	1365
			6-6/1	6 Str. 4 Sol.	Blue	5.2	1364
2-7/1 2-6/1	2 Str.	Red	2-7/1 2-6/1	2 Str.	Red	4.9	1362
			4-7/1 4-6/1	4 Str. 2 Sol.	Orange	5.0	1361
			6-6/1	6 Str. 4 Sol.	Blue	5.3	1360
4-7/1 4-6/1	4 Str. 2 Sol.	Orange	4-7/1 4-6/1	4 Str. 2 Sol.	Orange	5.2	1357
			6-6/1	6 Str. 4 Sol.	Blue	5.4	1356

The picture and the table tell the story. These service entrance connectors have the features utilities requested. Easy-to-puncture aluminum end caps are color coded. Barrels contain ALNOX, the joint compound that won't melt even at 550°F. Each connector is clearly marked for quick identification. The new 5/8" Alcoa® Service Entrance Connectors are packed 50 to the box. These connectors are sold by Rome Cable Div. of Alcoa.

Alcoa and EHV!

With pride, we point out Alcoa's continuous participation—since 1913—in engineering design toward higher transmission voltages. Design evolution of joints, dead ends, spacers, armor rods, dampers, and other accessories as well as new conductor construction is the result of these efforts.

Alcoa contributed extensively to General Electric Company's Project EHV at Pittsfield, Mass., in supplying structures, conductors, and accessories. The latter included two types of bundled conductor spacers, one of which is shown in the photograph. Design of these spacers involved special consideration to avert interference with radio and television reception.

When it comes to accessories for EHV, the most experienced source is Alcoa . . . by far.

Research at Alcoa

Conductors, bundling, dead-ending, connections, joint compounds, vibration dampers: Alcoa has studied them all from the time aluminum conductors were first used. We regularly provide customers with engineering data and recommendations based on our findings. Direct your inquiries to your local Rome Division salesman.

A technician at Alcoa's research facility in Massena, N. Y., attaches the driving motor to the conductor for a vibration-fatigue test.

Summing up:

Neither moisture nor extremes in temperature have adverse effects on Alcoa's new electrical joint compound, ALNOX—available now in easy-to-use plastic tubes.

Because 10,000 psi is standard pressure for all Alcoa compressors, you get maximum versatility and interchangeability from your pumps.

EHV—we're ready when you're ready with the most complete line of accessory items available to utilities today.

New 5/8-inch service entrance connectors are designed for quick, easy, efficient handling and installation.

Your nearby Alcoa-Rome representative is eager to supply full details on any or all of these items. Why not call him today?

ALCOA
ROME CABLE
DIVISION

► **Subox** has appointed **Bews & Co.** of Phoenix as its sales and engineering representative in the State of Arizona. A. I. Bews, owner of the firm, was born in England and was in Belgium at the time of the German invasion in 1940. He escaped to France and eventually returned to England, serving with Army Intelligence. He moved to the United States after the war, first settling in El Paso, where he went into sales engineering. Bews & Co. was organized as a separate entity last year to represent major manufacturers in Arizona and has specialized in heavy-duty mechanical equipment.

► Forty senior electrical students from Portland's Benson Polytechnic High School visiting **Mears Controls** at its new Beaverton plant received a surprise gift from the firm. Bernard C. West, Mears executive vice president, told the students that an H-25 low voltage circuit breaker would be delivered to the school's new $500,000 electrical shop for permanent use. Valued at about $1,000, the breaker is the first piece of new technical equipment to be put in the shop.

► Robert F. Schow and Warren Petersen have formed a new manufacturers agency in Los Angeles at 926 S. Atlantic Blvd. to be known as **Schow & Petersen Inc.** It will represent Faraday Inc., signaling equipment; Jaspar Blackburn Corp., electrical connectors; Continental Electric Co. Inc., integral horsepower motors; Sprague Electric Co., power factor correction capacitors; Hope Electrical Products Co. Inc., cast boxes and pole bases.

► **Thomas E. Topham** has been appointed Pacific Region district sales manager for the Fedders Corp. In the residential and commercial air conditioning field for 23 years, he most recently was associated with Soden Wholesale Air Conditioning at Riverside, Calif., as sales representative. In his new post he will service Fedders distributors in California, Oregon, Washington, Utah, Arizona, Nevada, New Mexico and Idaho.

► J. O. Steiny, president of Steiny & Mitchel Inc., electrical contractors, Los Angeles, has appointed **D. O. Eisenrich** and **R. C. Goodman** as assistant vice presidents and **B. R. Robinson** as assistant secretary of the firm.

► **Bendix Computer Division** has announced new appointments in the West. **Robert P. Fopeano,** former Eastern regional manager, has been transferred to Beverly Hills, Calif., as Western regional manager. **Anthony G. Baragona** has been made Los Angeles advertising and public relations manager.

► **Lee S. Inscho** has been named general manager of Young Electric & Mfg. Co. at Denver. He had been a field sales engineer for the company since September 1960 and before moving to Denver had been an electrical control design engineer for Pratt & Whitney Machine Tool Co. in West Hartford, Conn. Also announced by Young was the promotion of **Ward L. Kern** from sales engineer to sales manager. Before joining the firm in September 1960, Kern had worked for Graybar Electric Co.

► **Briegel Method Tool Co.** has appointed **H. J. "Hoogie" Hoogerwerf** as its Western Division sales manager. He will be responsible for the territory west of the Mississippi River.

► **Jack Crabtree** has succeeded **Squire J. Johnson** as manager, Western area of the Special Products Division, Acme Steel Co., with office in Los Angeles. Squire Johnson retired in January and is on a trip around the world.

► **E. V. Roberts & Associates,** Instrument Division, will represent **ITT** closed circuit television equipment throughout the West. The firm has offices in Los Angeles, San Diego and Phoenix.

► **Dale Brown** has been appointed representative for **Sunbeam Lighting Co.** in Utah and Montana. His headquarters are at 1735 S. 23rd St., Salt Lake City.

► **Jerome H. Feig,** president of Marvin Electric Mfg. Co., has been appointed treasurer of Epps Industries in Los Angeles.

► **Hans E. Bannies** has been appointed marketing manager for **Globe Electric Mfg. Co.** of Gardena, Calif.

► **W. A. Dolde Sales Co.** of Albuquerque has been named to represent **Standard Transformer Co.** in the New Mexico territory.

► **E. D. Maupin** Associates, engineering representative, has an office and warehouse at 4020 Avalon Blvd., Los Angeles 11.

Earl S. Condon
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- *Chase & Sons, Inc.*
- *Collyer Insulated Wire Company*
- *Electro-Solids Controls, Inc.*
- *Halex, Inc.*
- *Hughes Aircraft Company* (INDUSTRIAL SYSTEMS DIVISION)
- *Husky Products, Incorporated* (DIVISION OF BURNDY CORPORATION)
- *Lapp Insulator Co., Inc.*
- *Lotran, Inc.*
- *Omega Dynamics Corp.*
- *Preformed Line Products*
- *Standard Elec. Products Co.*
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ELECTRICAL WEST
VOL. 127, NO. 6 DECEMBER 1961

AFTER THE ALARM SOUNDS

For most of you that read this—the ominous buzz of your home NEAR system receiver would give you time for a last look at your families, a prayer—but nothing that might save their lives. This is the overriding paradox of the administration's pushing the utility industry into a crash program to install a nation-wide alarm system without a concurrent statement of the urgency to build and stock shelters. **The need for an alarm system can only precede the need for shelters by minutes.**

Nuclear warfare has been a reality for 16 years. As a nation we have been content to proclaim "nuclear war is too awful to happen," forgetting that we once made it happen. As a further idiocy, *we make sure that it won't happen, by not being prepared to survive if it does.* This is like saying "if I don't wear a rain coat, it won't rain."

Now, alas, 16 years later, with little or no thought to the means of survival it becomes important that there be an alarm in the event of attack—and that the utility industry ram, cram and jam it down the country's neck.

We feel that some other things must come first.

First and foremost is the crying need for our government officials in the AEC and the military to confront the nation with an appraisal of the risks of nuclear war and of the means and requirements for optimum survival. As a layman it appears that civil defense—the will and ability to persevere during the most devastating attack and come up fighting—should be an essential part of our military posture. NEAR program should be but a part of a complete civil defense program. Short of a complete program the billion dollar NEAR program is idle speculation.

In the next regular issue of ELECTRICAL WEST a special report by a McGraw-Hill editorial team will treat the fundamentals of survival from the industrial viewpoint.

Let us be clear. We are calling on government for some guidelines by which individuals and power companies can make rational decisions. We are not asking for vast federal spending or additional bureaus—just facts.

With a positive statement on the part of government, many of the detailed problems will be quickly resolved. We believe the NEAR system can be applied with adequate testing to all power systems. We think the utility commissions will find a way to allow the power companies to be repaid for their investment in the signal equipment. We think the legal problems growing out of a malfunction where there is no fault on the part of the power company are groundless. We think that John Does by the millions will willingly buy receivers, build and stock fall-out and blast shelters.

America will shoulder the burden—if someone will just tell us what burden we are asked to shoulder.

Faced with serving its expanding load, Stanford Research Institute builds a 60- to 12-kv substation with substantial savings

AN ECONOMICAL SUBSTATION

JAMES H. HANSON, PROJECT ENGINEER, STANFORD RESEARCH INSTITUTE

In the expansion of its facilities in Menlo Park, Calif., Stanford Research Institute found that the utility serving it could not accommodate the increase in demand from 1,800 to 2,500 kva on the existing 12,000-v feeder. The utility indicated that it would be necessary for the institute to change its system so as to accept power from the 60-kv subtransmission line going past its property.

So the institute found itself faced with the choice of two alternatives:

1. It could provide substation foundations and fencing to the utility in accordance with the utility's requirements at a cost to the institute of close to $10,000 and at the same time lose the 4% primary power discount that is available for service delivered at 12 kv and which would amount to approximately $5,000 per year.

2. It could purchase the complete 60-kv substation, including transformer and switchgear, thus retaining the 4% primary power discount, which would amount to a net annual saving of approximately $3,600 when transformer losses were taken into consideration.

12-kv Consideration

The institute's first reaction was to proceed under plan No. 1 and to furnish the substation site to the utility, buying power at 12,000 v without benefit of the 4% primary discount. Closer investigation disclosed, however, that the use of equipment of a new design would greatly reduce the cost of the substation, require less real estate, eliminate the need for a main switch on the 12-kv switchgear and in general make the most satisfactory installation.

Initial estimates were found to be valid in the final installation. For an initial increase in cost of only $29,000 over the $10,000 required to make the site habitable to the utility, a very satisfactory substation installation was made, which at the present rate of utilization will pay for itself in less than 10 years. Since future growth is anticipated, the savings will rapidly increase beyond those originally contemplated.

Details of the construction of the substation are outlined in the accompanying pictures.

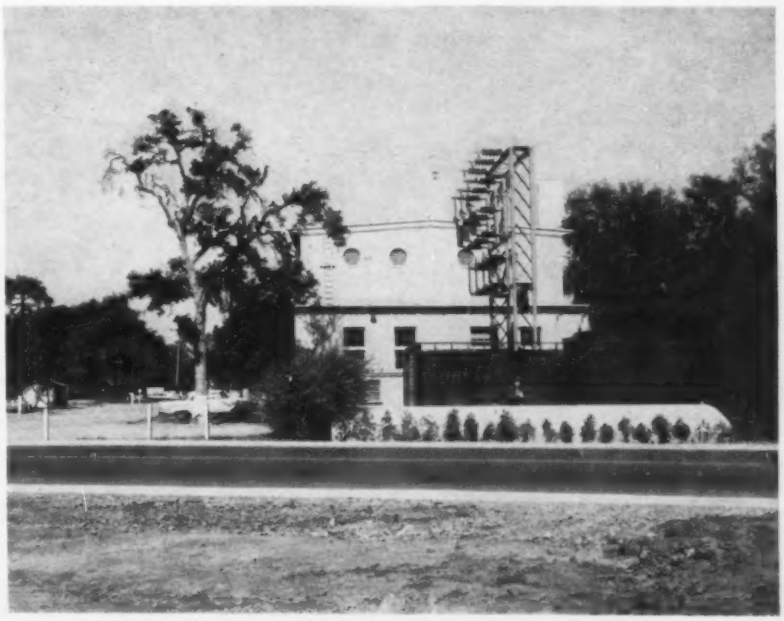
Utility Supply

The utility supplies power to the substation via three No. 4/0 stranded aluminum conductors terminating on the 34-ft-high steel structure which is designed for a minimum total wire pull of 5,000 lb. This single structure also accommodates the main switch, which is a manually operated vertically mounted circuit-switcher, capable of interrupting loads up to 600 amp at 69 kv and with fault closing capacity. The circuit-switcher is arranged for operation from outside the substation enclosure in accordance with code requirements.

At the time of its installation, the manufacturer reported this to be the first industrial installation of such a switch on the West Coast, although it is understood that many utility installations had been made previously, as well as several industrial installations and utility installations since that time. The utilization of the circuit-switcher with its load interrupting capacity on the 60 kv in place of a simple horn gap air switch proved to be much more economical than furnishing the necessary horn gap air switch on the 60 kv plus a metal-clad fused load interrupter main for the 12-kv switchgear. The circuit-switcher is arranged to meet all requirements of the code with regard to service entrance switching.

Short circuit protection is provided by three drop-out type, boric acid filled power fuses, mounted ver-

The utility supplies power to the substation via three No. 4/0 stranded aluminum conductors terminating on this 34-ft-high steel structure designed for 5,000-lb pull



tically below the circuit-switcher. The power fuses are rated 2 million-kva, three-phase symmetrical interrupting capacity at 60 kv, which is more than the presently available three-phase symmetrical short circuit current of 675,000 kva from the utility system. This insures that adequate protection will be available when the utility at some future date should decide to increase the short circuit capabilities of its system.

Mounted directly below the fuses is the three-phase metering unit furnished by the utility. The secondary leads (supplied and wired by Pacific Gas & Electric Co.; contractor supplied and installed the conduit) from the metering unit were wired by the contractor to the metering enclosure, which the contractor furnished in accordance with utility requirements on the outside of the substation fence.

For aesthetic reasons the steel structure was ordered nongalvanized and was shipped from the factory with a zinc chromate primer. The finished structure was painted on the site with a rust preventive primer and finish coat to blend with the surrounding trees.

The main transformer is oil insulated type OA rated 3,750 kva, 55 C temperature rise, three phase, 60 cycles, 60 kv delta high voltage, 12 kv grounded wye low voltage, with two 2½% full capacity taps above and below normal in the high voltage winding. The transformer insulation is suitable for operation at 65 C with a transformer rating of 4,200 kva and provision has been made for adding cooling fans and control cabinets at a later date without de-energizing the transformer, to give an increased rating at 5,250 kva. Thermal switches operating on hottest oil temperature are provided for control of the future cooling fans. Among the standard accessories are a pressure relief valve, a vacuum gage, liquid level gage and thermometer.

The transformer tap changer is of the manually operated no load type and the transformer oil is completely sealed from contact with ambient air to minimize oxidation and moisture absorption. The high voltage winding is brought through 60-kv oil-filled bushings and the low voltage winding is directly connected via 12-kv bus duct to the four cubicles of 12-kv outdoor metal-clad switchgear of the fused load interrupter type.

The 12-kv metal-clad switchgear assembly is provided with 600 amp, three-phase copper bus bars connected directly to the transformer terminals via the bus duct. Each cubicle consists of a manually operated fused load interrupter rated as follows:

Load interrupting current, 600 amp.

Continuous current, 200 amp.

Short circuit interrupting rating, 260,000 kva.

Safe fault closing rating, 27,500 amp asymmetrical.

Short time rating, 40,000 amp for 10 cycles, 25,000 amp for four seconds.

The power fuse current rating was selected after careful analysis of the entire distribution system. System protection is provided by power fuses almost exclusively, and this has proved both economical and satisfactory. Careful selection of fuse ratings guarantees discrimination between individual load centers, underground and overhead feeder ratings the main 12-kv outdoor metal-clad switchgear and the 60-kv power fuses.

The four-cubicle, 12-kv outdoor metal-clad switchgear is designed for future extension as required. It presently distributes the load underground via cable in concrete-incased conduit ducts as follows:

Cubicle No. 1—steam plant transformer bank

Cubicle No. 2—main office building

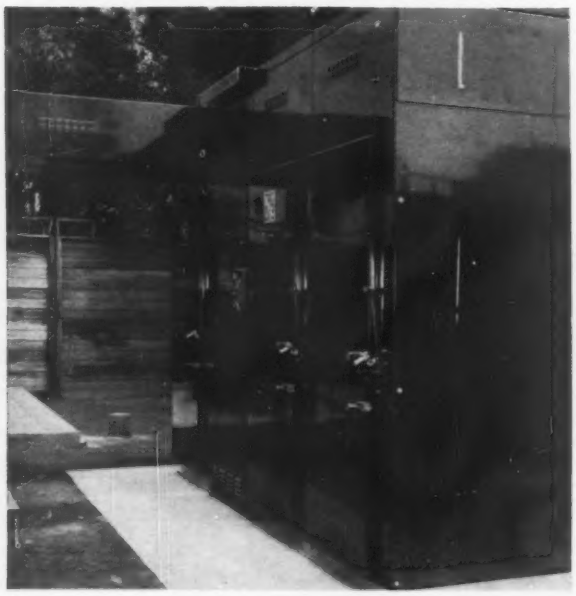
Cubicle No. 3—overhead line

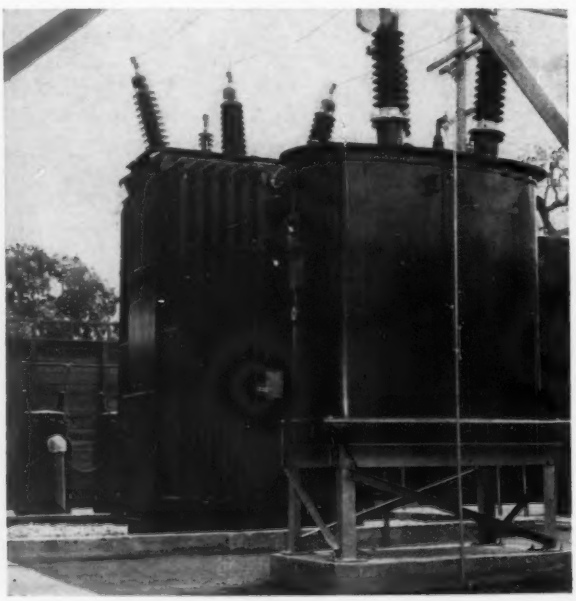
Cubicle No. 4—overhead line

The 12-kv overhead line, which covers most of the 85-acre site, is fed from both ends and normally is sectionalized. In an emergency, the whole line can be fed from either end.

Tongue and groove redwood planking with a slightly tinted natural redwood finish was used for the substation enclosure. The entire substation area is asphalt paved with the exception of the rock-filled catch basin surrounding the transformer. The final appearance of the substation is considered to be quite unobtrusive and compact considering the normal appearance and size of 69,000-v step-down substations.

The 12-kv switchgear is provided with three-phase copper bus bars connected to the transformer terminals via the bus duct





Method of taking pole borings three feet above the ground line

General view showing portion of Chelan No. 2 line and terrain

WHAT POLE INSPECTION SHOWS

R. L. McCUTCHAN, SEATTLE, WASH.

The ability of pressure creosoted Douglas Fir poles to give long service life under extreme climate conditions is well known, but good performance often goes unnoticed. Recently, a very thorough inspection was made of two pole lines in the State of Washington which had been in service for more than 30 years.

One of the lines inspected was Chelan No. 2 of the Washington Water Power Co. running north from Stratford, Wash. Here, 72 pressure creosoted poles in H-frame construction (36 H-frames) cross a narrow irrigated valley to the summit of rocky hills covered with sage brush. Conditions favoring decay are prevalent in the irrigated valley crossed by the line.

The other line inspected was that of the Puget Sound Power & Light Co., located on 140th St. near Kirkland, Wash., on which the poles had been in service for 32 years.

The inspection covered 40 poles which were originally set in 1928 but which were relocated in 1958 because of a street widening project. The climate of western Washington, where these poles are set, with its mild temperatures and moisture, is conducive to the decay of wood.

Original records of treatment used on the Chelan No. 2 and the Kirkland poles, and analyses of creosote used in each treatment was available. In both cases the poles were green and were conditioned in the retort by the Boulton process, then treated by the empty cell process.

Testing procedure agreed upon was to take two borings from each pole, one six inches below the groundline and one three feet above the groundline. The entire treated portion of the boring was used in making assays to determine the present creosote content.

Inspection Results

On the Chelan No. 2 line, condition of the poles was found to be excellent. There were no visible indications of decay. In spite of the scorching summer heat, the checking on the poles could be classified as limited, the largest check being approximately 3/8 in. in width.

All checks were carefully examined for exposed untreated wood. None was found.

The average core retention for both test zones (six inches below ground line and three feet above groundline) was found to be 11.32 lb per cu ft. Average depth of penetration was 1.83 in. The present average retention of creosote in the poles was calculated to be 6.06 lb per cu ft, based on pole volume.

There was some indication that the creosote may have moved inward at the groundline. Penetration in the zone six inches below the groundline was 20% greater than at the point three feet above the groundline. There also was 38% more oil present in the zone six inches below the groundline.

Season check on all poles in the Kirkland line could be classified as limited. Only a few were wider than ¼ in., the widest being ⅜ in. All checks were carefully examined for presence of exposed untreated wood. None was found, indicating adequate Boultonizing treatment.

It was determined through extractions that the present net retention of creosote is 8.65 lb per cu ft. Calculations to obtain the present pounds per cubic feet were based on the average mid-diameter of 9.25 in.

General condition of the poles was found to be excellent. Only one was found with any indication of decay. This had a rotten heart center approximately one to 1½ in. in diameter in the zone six inches below the groundline. Another boring was taken 12 in. above the groundline but no decay was found.

Great care was taken to bore each pole to the center and to sound each pole with a hammer to determine if there were any rot pockets.

Condition of the poles on both the Chelan No. 2 and the Kirkland lines was so good that it would be reasonable to predict at least 30 years additional uninterrupted service for these poles.

WORK MEASUREMENTS HELP ALL

Quick acceptance of such a program is assured as soon as it is shown that each employee will be developed to his maximum usefulness

GEORGE MAGILL, COST MEASUREMENT ANALYST, ARIZONA PUBLIC SERVICE CO.

Assemble a group of utility executives, accountants, engineers, superintendents and managers anywhere, anytime, and ask them to define "work measurements." The chances of having any two of their answers alike are quite remote. Those not familiar with work measurements will probably ask:

1. What are work measurements?
2. How are work measurements started and what are the basic *principles* of work measurements?
3. What can work measurements do for management, supervisors and employees?

Following is a presentation of various thought-provoking ideas written by industrial engineers, measurement analysts and many others interested in work measurements in an attempt to answer these questions.

What Are Work Measurements? If the word "work" is omitted from the question, "What are work measurements?" leaving "What are measurements?" then measurements can be related to many items associated with measuring, such as yardsticks, clocks and scales. Such simple units can also be applied to the process of work measurements.

Thinking back to the farmer, the mule and the walking plow of yesteryear, one of the first questions of this period probably asked a potential plowhand was, "How many acres can you plow in a day with a good mule?" The answer may have been one, two or three acres, depending upon how fast the mule moved, how sharp the plow, how strong the plowhand and, no doubt, the weather. When that farmer posed the question, "How many acres can you plow in a day?" it was nothing more or less than a work measurements question.

Today, business competition has emphasized the necessity of controlling such items as production costs, stock inventory, sales expenditures and many others. Realizing then that these items of business must be controlled, how can this be accomplished? To control anything, it must first be measured. The next step is work measurements.

Work measurements can be defined simply as a means of establishing what a fair day's work should be. It can be separated into two major components:

1. A measure of the volume of work completed.
2. A measure of the hours required by employees, departments or sections to complete the amount of work assigned.

Most managers, supervisors and foremen are faced with the problem of estimating the amount of work on hand, how much time will be required to get the job done, and can the job be done with the manpower assigned them. In simple terms, work measurements are a managerial tool that can be used to estimate more accurately the amount of time required, to perform a given task.

The proper use of measurements can remove much of the mystery or guesswork from a job. It can also instill confidence in the people doing the job, as well as in the manager or supervisor directing their activities.

Quantities of work done, or "activity reporting," is the essence of work measurements. Later it is the basis of establishing man-hour standards, construction unit standards, travel standards or any other standards necessary to measure effectively a job performed to determine if the job is being done above or below a standard.

If an employee or department is consistently above the accepted standards, one or more of the following is indicated: (1) If the quality of work performed is within the acceptable standards and the quantity standards have been time tested, you have better than average employees doing the job. These employees should be observed as it is apparent that future managerial material is present in this group; (2) the stand-

The proper use of measurements can remove guesswork and instill confidence in the people doing the job as well as in the manager or supervisor directing their activities

Work measurement is simply a means of establishing what a fair day's work should be

ards need to be evaluated to see if they are still applicable to the work performed. (Standards often become out-dated because of improved methods and modern equipment, and should be revised); (3) the *quality* of work performed may not be up to par, which could result in an above-par *quantity* of work performed.

How are work measurements started and what are the basic principles of work measurements? Programs are started, in some instances, on a full-scale basis by management retaining consultants who select, instruct and train company personnel to carry on the program after the consultants have completed their assignments. In other instances, work measurements are started within the company. This is accomplished by selecting personnel to be trained in work measurements who can talk with people, work with people and, finally, teach other employees the techniques of using measurements on the job.

The employees' reaction to work measurements is a major consideration. Have they been assured that they will not lose their jobs? Has the use of pace, time and activity reporting been explained? If these basic steps have been taken to dispel fear, doubt, prejudices or misunderstandings that can be associated with work measurements, then the human relations aspect has been considered. **This consideration of the employee is one of the first principles of work measurements.**

Quick acceptance of the progress by company personnel can be expected once they learn the program will be the basis for training or retraining and provide information that will permit supervision to develop each employee to his maximum usefulness.

One of the major benefits employees expect to obtain from increased productivity is a higher standard of living. If there is no indication that this will result, tabulating productivity will not appear to be advantageous to them. They will not be receptive to any form of measurement.

Introducing work measurements can be compared to the reactions of a spinning gyroscope. Sounds ridiculous! But picture, if you will, a gyroscope standing upright spinning at a high speed. Now, if you move the gyroscope slowly it will obey your command with little or no resistance. However, move or push the gyroscope rapidly and it will resist the change, even to the point of possibly stopping.

Are human beings any different in their reactions than the spinning gyroscope? Probably not. To combat resistance, measurements must be explained and then placed into operation gradually. During this process the employees are taught to think, objectives are determined and the employees are consulted in determining the activities to be measured. There is no need to elaborate on the outcome of a measurement program, or any other program for that matter, that is forced into operation — its chance of success is very limited.

Regardless of the techniques used, most work measurement endeavors follow the same pattern.

First, the work routine is analyzed and the steps recorded in the order of sequence.

Second, the time that is required to do each of these steps is recorded. (The time reporting can range from a fraction of a minute to one-half or one-hour intervals depending upon what degree of refinement is desired.)

Third, a procedure for tabulating the number of times that each activity is performed.

When these three are put together, they give an idea of the job that is being performed, man-minutes or man-hours required to do the job, and the volume of work being done.

Jobs that have large volume and repetitious operations are usually selected to be measured ahead of departments where the work is creative and no predetermined time is feasible.

Work measurement reporting must not be so burdensome that it is done haphazardly or erroneously by foremen and supervisors. Some of the natural resistance to filling out forms can be avoided by simplifying the procedure. Information can be coded. Electronic Data Processing (EDP) equipment can be most helpful here, since it normally functions rapidly on coded information. The job estimator can show

Work measurements people claim that any type of job known to man can be measured

the code numbers for retirement units on the work order and the foreman can report his time via these codes.

Programs in work simplification, improvement, work planning and work scheduling have to be done by people and the problem then becomes basically that of motivating people and again human beings have emotions, frustrations and great interest and pride in keeping their jobs. Here is a question in the back of each person's mind when you start interfering with the old flow of things by a new gadget called work measurements, "What's in it for me?" So, our *principle* at this juncture is, how do you teach him that there is a chance for advancement, or some other opportunity which he did not see, and does not now see until you demonstrate it to him.

How are standards for work performed arrived at? One or more of the following five methods are ordinarily used:

1. Standards based on estimates.
2. Standards calculated by stop watches.
3. Standards by the use of work sampling.
4. Predetermined time standards.
5. Standards by special type camera or micromotion.

Standards based on estimates can be developed from past production records, better known as historical data. Also, when identified, each major activity of an employee or department can be assigned an estimated time. Standards so established become estimated indices of work measurements.

The stop watch technique is, no doubt, one of the most common methods used to establish work standards. Because it is so common, its use has been abused; therefore, extreme care must be exercised in its use. It is still possible to measure effectively work performed by com-

bining a group of motions to make a compatible unit of work.

What can work measurements do for management, supervisors and employees? A detailed dissertation of all the advantages and applications of work measurements cannot be covered here, but some of the results of work measurements that are in use in some areas of the utility industry today are:

1. Protection and communication.

A six-month study at isolated microwave stations covering the hours worked by zones, the hours traveled by zones, the equipment repaired by zones and the parts required to maintain the electrical equipment in each zone indicated some of the following:

a. Equipment failure did not increase as much during snow storms as was expected, but did increase during summer dust storms.

b. Travel hours to and from isolated stations were as much as 65% of the total man-hours required to maintain the equipment.

c. Equipment manufactured by one company required 35% more maintenance than similar equipment manufactured by a competitor.

Now, of what value is this information to management? Managerial action could be influenced by this study in the following ways:

a. Management would recognize the impact of dust storms on equipment failure and plan for additional personnel or overtime during the summer season.

b. The permanent assignment of an employee to a remote station may not be economically feasible as only 35% of his total working hours would be required to maintain the equipment.

c. Management may request the purchasing agent to procure the manufacturer's equipment that requires the least amount of maintenance.

2. An additional area where work measurements has been utilized in pinpointing the work accomplished, as well as the work to be accomplished, is that of residential, commercial and industrial sales. Some of these findings have been:

a. That commercial and industrial salesmen had concentrated their sales efforts on air conditioning and heating, resulting in a limited sales effort on rural and irrigation sales.

b. Emphasis was placed on diverting the residential sales efforts from bulb sales to the sales promotion of large equipment, such as washers, dryers, etc.

The combined activities of the residential, commercial and industrial sales shown in a monthly management report indicated the following:

a. Of the total sales hours worked, 63% of the time was devoted to customer sales activities.

b. Of the total sales hours worked, 24% af the time was utilized in such items as extension agreements, company sales functions and the paper work covering sales activities for the month.

c. Travel hours accounted for the remaining 13% of the total hours worked.

In concluding the attempt to answer the three vital questions related to work measurements, it is important to recognize the impact that a work measurement program can have in the never-ending search for new and more efficient ways of doing business.

Top management needs only to receive the measurement reports that will indicate the work load, the costs or savings, the smooth-operating areas as well as the trouble spots, the productivity by departments and the fact that schedules are or are not being met.

The results of measurements take much of the guesswork out of job classifications as it enables the supervisor to be reasonably sure that specialists are doing specialists' work and clerks are doing clerical work.

As measurable activities are tabulated and recorded into daily, weekly or monthly reports, the employees can see the fruits of their labor, the supervisor can determine his high and low work periods and take action to level off the peaks and valleys of his operation.

Measurements, like everything else in this ever-changing world, require revisions and must be kept current so that the data tabulated and analyzed will present a current picture of a department, section or company's operation.

Some utility companies have used measurements for 25 to 30 years and are constantly on the alert for new techniques. One desirable work measurement function still under development is the measuring of the effectiveness of transmission and distribution crews by productive and nonproductive time. Another is the development of the compatibility of work measuring units, retirement units and accounting units to create a more efficient operation. This system can then be used advantageously in maintaining low rates for customers and producing more attractive returns on stockholders' investments.

Straight-Line Depreciation

Last fall during hearings on its requested increase in gas rates, the Pacific Gas and Electric Co. changed from sinking-fund to straight-line depreciation for rate making purposes. Summarized here are some of the advantages as held by the proponents of straight-line depreciation.

• **Simplified Calculations**—The calculations necessary to determine depreciation accruals are greatly simplified under a straight-line procedure. There are no complicated annuities to calculate. No interest earnings need be determined. The results of age-life studies can be more readily adopted without being conservative when selecting a life for long-lived properties.

• **Everybody Is Doing It** — The straight-line procedure is now used by the great majority of utilities throughout this nation. It has been pointed out that nearly all of some 300-odd utilities under the jurisdiction of the Federal Power Commission use a straight-line procedure.

• **Conforms To Income Tax Methods**—The use of straight-line depreciation conforms to the requirements of the Treasury Department in computing depreciation for federal income tax purposes.

• **Greater Initial Accruals**—During the early years of the life of the utility plant, the straight-line depreciation method results in greater accruals than does the sinking-fund method. It is felt that, during the postwar period of heavy utility growth, the average age of utility plant is small and economic times are relatively good. Under these conditions it is said to be desirable to accrue slightly larger amounts for depreciation as determined by the straight-line method. Thus, the straight-line procedure postpones fewer accruals to the indefinite future.

These general advantages might be expanded to include more detailed arguments. A good source of additional information is the 1943 report of the committee on depreciation of the National Association of Railroad and Utilities Commissioners. But look out! Once you become involved in the theories and mathematics of depreciation you will return again and again to the subject.

Top brass speakers at the 8th Hawaiian conference of PCEA included (left to right) C. W. LaPierre, executive vice president of General Electric Co.; Fischer Black, vice president of Tampa Electric Co.; Walter Lucking, president of Arizona Public Service Co.; Tom Delzell, board chairman of Portland General Electric;

Jack Horton, president of Southern California Edison Co.; W. H. Rowan, vice president of Babcock & Wilcox Co.; W. M. Wallace, vice president, Allis-Chalmers Mfg. Co.; Jack Corette, president, Montana Power Co.; and Frank Wiley, factory superintendent, Ewa Plantation Co., who presided over the general sessions

Speakers Spark Hawaiian Program

Energy sources and the business environment were dominant themes of the speakers who made the program of the eighth Hawaiian conference of Pacific Coast Electrical Assn. an outstanding convention highlight of the year. Top echelon industry executives presented to the 400 participants imaginative and thought-provoking discussions that reflected the vigor and confidence with which the electrical industry faces its challenging future of growth and public service.

New dimensions for the growth and productivity of the industry have been created by the marriage of electronic and electrical technologies, according to General Electric's Vice President C. W. LaPierre, the lead-off man on the program. He pointed out that this marriage has expanded the horizons for power applications for still other technologies and uses to a point that taxes the imagination. Already, he commented, at least 10% of the huge amount of electric energy generated in the United States goes to work through electron tubes.

Scientific breakthroughs in the thermionic, thermoelectric and magnetohydrodynamics areas of direct conversion of heat to electrical energy will make tremendous demands on management of both utility and manufacturing companies, according to W. M. Wallace, vice president and general manager of the Industrial Equipment Division of Allis-Chalmers. He underscored the fact that we are living in the most dynamic scientific period in the world's history and that we must strive not only to gain a reasonable understanding of these developments but also to put them to the most beneficial uses of mankind. The swift pace of technological growth will require a tremendous number of trained and educated people. Management now has the tremendous responsibility of finding people of the proper ability, imbuing them with the vision they need and conveying to them the knowledge, the skills and the understanding that will be required to utilize full benefit from this scientific age.

Walter Lucking, president of Arizona Public Service Co., expanded the thought that these "little black boxes," which may be energy sources of the future, pose still another challenge to management. He championed the concept that present-day power companies should look upon themselves as merchants of energy rather than suppliers of electricity. He warned that utilities could be left out in the cold if they did not keep alert to the implications of new forms of energy production and be ready to supply energy in whatever form and from whatever source would best fit customer needs.

Dr. J. A. Hutcheson, vice president-engineering of the Westing-

H. G. Dillin, president, San Diego Gas & Electric Co. and PCEA president, at the rostrum during the opening session

Ralph Johnson, president of Hawaiian Electric Co., with speaker Dr. John Hutcheson, vice president-engineering, Westinghouse

Highlight of the traditional Hawaiian hospitality was the luau for the mainland visitors and speakers hosted by Hawaiian Electric Co. Here guests watch as the imu is broken

house Electric Corp., predicted that electrical manufacturers will be building these "exotic" power plants just as routinely as they now build conventional plants for land-based applications, such as the possibility of using solar generators for irrigating undeveloped areas of the world.

In predicting that the electrical industry will produce and distribute 3½ trillion kwh in 1980, Dr. Hutcheson emphasized that our distribution systems will be in store for a major overhaul from concept to actual hardware. He urged that we begin thinking about much higher load densities and the problems of distributing power in the megapolises that are in formation around the present high population density centers of the country. He also predicted that entirely new concepts of electrical services for the home will emerge in the not-too-distant future.

Also commenting on the power requirements for the future, Will H. Rowan, vice president of Babcock & Wilcox Co., predicted that the 1980 requirements of 3½ trillion kwh would be generated as follows: 64% by fossil fuel but very likely in much more sophisticated and more efficient thermal cycles, 20% from the atom and 16% by hydraulic plants. He also predicted that fossil fuels at that time will cost at least twice as much as they do today but that there will be substantial reductions in the over-all capital costs for thermal plants as well as substantial reductions in capital and fuel costs for nuclear plants. Capital economies and fuel efficiency have been responsible for holding the line on over-all energy costs. He cited figures showing that the cost of a power plant per kilowatt is only from 20 to 60% higher than the cost in 1920. A major factor in holding down equipment cost has been the reduction in the amount of material used to generate a kilowatt-hour largely by increasing the size of the boiler, turbine and auxiliary components. Automation and improvement of plant safety through better control has also contributed to the general cost trend. He also predicted that by 1980 steam conditions can be expected to approach 10,000 psi and 1,600 F—largely due to metallurgical developments now on the horizon.

Convention committee: Colin Murdoch, Maui Electric, Harry Palmer, Herb Heinrich, general chairman, Gene Helbush and Dick Summers, all of Hawaiian Electric

Environment Problems

The business environment today also came in for considerable discussion by other top utility executives. Thomas W. Delzell, chairman of the board of the Portland General Electric Co., presented to the convention the thought that utility responsibility is more than utility service. Two other broad areas are involved, according to Delzell. The first of these is the responsibility that the industry has to its customers, its stockholders and itself in maintaining its vitality through the free enterprise system. The second is the area of citizenship responsibility to the communities served. He called "alarming" the trend of more and more governmental regulation and control over the nation's business system, which is most apparent in the electric utility industry. Correcting this trend is a matter of citizen education and active support of political candidates who support the economic system under which the country has flourished. He also emphasized the importance of good corporate citizenship that actively supports those things which promote

community welfare and area development.

The creeping encroachment of socialism was the subject of the remarks of J. K. Horton, president of the Southern California Edison Co. He called for action to awaken the American people, who after all don't want socialism, to the dangers of the continuous erosion of the economic system. This erosion results from giving the government control over multitudinous small and large matters affecting our lives and our livelihood. A glaring example of the abuses that stem from big government, which he cited, included a case where farmers leased state land for 25¢ an acre and received $9 an acre from the federal government for not cultivating it.

J. E. Corette, president of the Montana Power Co., upheld the utility industry as a desirable employer for all levels of skills and education. He cited ten sound reasons why this is true and asserted that excellence in management in an electric utility company is one of the essentials for the future success and preservation of the company. He stated that to obtain excellence in management it is first necessary to select young people of capability to fill every job in every department of the company and then train these people to become an excellent management team. This requires a well organized plan and program that is wholeheartedly supported by the current management team. Such a plan involves good recruitment and selection; the acquisition of broad experience for the trainee by rotation throughout various jobs in the company; advanced training or education outside the company; and a sound basis for selection for advancement. As for the individuals in this training program, they should get all the education they can, they should do a good job of every assignment given them, they should be completely honest and straightforward with their associates and their supervisors, they should gain experience in public affairs and take high interest in the general welfare of the company.

Three of the sessions of the two-day convention were devoted to general meetings. The fourth was comprised of three parallel sessions covering administrative services, business development and engineering and operating problems, respectively.

The gracious hospitality and superb convention arrangements under the direction of Herb Heinrich of Hawaiian Electric Co. contrived to make the meeting as pleasant as it was informative.

Business Development Section was chairmanned by Hall Hoxie, American Factors Ltd. (second from the left) with his speakers Dr. R. C. Weaver of the Urban Housing & Home Finance Agency, Washington, D.C.; Frances Armin of National Wiring Bureau; and Morley Theaker of Sears, Roebuck & Co., Hawaii

Henry Yamashita, manager of Molokai Electric, led discussions in the Administrative Services Section, whose speakers were O. R. Doerr, vice president, Pacific Gas & Electric Co.; Albert Cage, California Electric Power Co.; and C. W. Leihy, Electrical West

The Engineering and Operating Section parallel session presided over by Carl Williams of Hawaiian Electric Co. (left) with his speakers J. K. Dillard of Westinghouse, Ted Meyers of Allis-Chalmers, San Francisco, and C. L. Phillips, General Electric Co.

New officers of the Accounting and Finance Workshop of the Northwest Public Power Assn. were elected during the recent annual meeting in Everett, Wash. Heading the group for 1962 will be Bert Lemoine, controller of Tacoma City Light, chairman; and Robert Beistel, right, office manager of Lane County Electric Cooperative, Eugene, Ore., vice chairman

NWPPA Workshop

Approximately 80 accounting and finance representatives attended the 14th annual meeting of the Northwest Public Power Assn. Accounting and Finance Workshop in Everett, Wash., Oct. 5 and 6.

Keynote speaker Bill Trommershausen of R. W. Beck & Associates emphasized long-range utility planning. He said: "Long-range plans, when properly reduced to dollar results through economic analysis can assist management in the following important ways: (1) by forecasting the probable results of carrying out specific proposals, programs and goals; (2) by providing a sound basis for revising programs, goals and policies; (3) by providing a comparative yardstick so that operating performance can be matched against forecasts; (4) by providing a sound basis for estimating future power costs, both wholesale and retail; and (5) by giving an indication of the surplus revenues that may be available for reinvestment in the industry or for reduction of rates, or both."

The use of operating statistics as tools for management was outlined by Elmer W. Moke, chief of rates and statistics, BPA. He provided information showing distribution expenses for city, PUD and cooperative distributors of power, as related per consumer, per kwh and average use. The distribution expenses were divided among operation and maintenance, customer accounting and collecting, sales promotion, and administrative and general expenses. The tables also showed average number of consumers, plant investment per consumer and consumer density for cooperatives.

Bert Lemoine, controller of Tacoma City Light, was elected chairman of the section for 1962, with Robert Beistel, office manager of Lane County Electric Cooperative, as vice chairman. The group voted to meet in Eugene, Ore., in 1962. Harold King of the Eugene Water & Electric Board will act as arrangements chairman.

The REA Accounting Section held a breakfast meeting prior to the NWPPA Workshop opening. They selected George C. Hogeweide, office manager of Inland Power & Light Co., Spokane, Wash., as 1962 chairman.

► **Illuminated Sign Manufacturers Association of B. C.** has been formed at Vancouver, B. C., with Alan Napier as president. The association is tackling the problems of legislation being passed affecting sign erection in British Columbia. One of the first matters attacked is a proposed bylaw in Vancouver that would prohibit roof signs entirely on two arterial streets in the city and prohibit any sign projecting more than 12 in. from a building. Napier said the association would welcome some policing of signs but felt the proposed bylaw went too far and that a compromise was essential.

► **Electric Club of Los Angeles** started its new fall season with its new officers: **L. Dean Fowler,** General Electric Co., president; O. J. Paul, the Ralph Parsons Co., first vice president and program chairman; Frank Reeves, Automatic Switch Co., second vice president; John H. Mead, Southern California Edison Co., third vice president; Howard C. Johnson, Thomas & Betts Co. Inc., secretary-treasurer; and Donald E. Steele, sergeant at arms.

► **Southern California Chapter,** International Association of Electrical Inspectors, elected Jim Bradsbury, Santa Barbara chief electrical inspector, as chairman for the year 1962, with James Rogers of Fullerton, vice chairman and Charles Metzger, Long Beach, re-elected secretary-treasurer. On the executive committee will be Past Chairman Bud Pollock, Willard Burk, Mike Wintz, Paul Shigley, Marty Luskin and Ray Gunning.

Ronald Reagan, motion picture and TV star, was guest of National Electrical Contractors Assn., Oregon-Columbia Chapter, at Portland Sheraton Hotel recently. Reagan, an outspoken authority on Communist encroachment and abuses of government control, spoke to NECA members and their guests on first lap of an eight-week speaking tour. Pictured with Reagan are, from left: J. W. McKinnon, chapter president; S. S. Adams, chapter governor; Riley R. Taylor, program chairman and toastmaster for the evening; Robert P. Burns, chapter manager; Reagan; and J. L. Krauser, member of the board of directors

ELECTRICAL WEST DECEMBER 1961

CONTRACTING & CONSTRUCTION SECTION

STATISTICS / COSTS / PROPOSED PROJECTS / NEW PRODUCTS / NEWS

LATE NEWS FLASHES

State Safety Inspectors Needed

Electrical safety engineer examinations for California's Division of Electrical Safety will be held on Jan. 13, 1962, but applications to take the examination should be made before Dec. 22, according to E. E. Carlton, who heads the division. The applications may be made at a state personnel office in Sacramento, San Francisco or Los Angeles. The division, needing to increase field staff to match the industrial growth of the state, has several good jobs open.

Sales Institute to Come West

After a trial run in Washington, D. C., just prior to the NECA convention, the National Electrical Contractors Assn. Sales Institute will be brought to the West this winter if there is sufficient interest, it was announced. A session may be held around Denver in March and another either in San Francisco or Los Angeles the following week. A few Western contractors attended the original institute, among them Les Barnes and Paul Briggs of Spokane. Their favorable reports have led to a demand for the institute to be brought West.

What It All Means

A Labor Agreement Workshop was scheduled to be held Dec. 2 in Spokane so that both the background and the meaning of the terms of the Inland Empire labor agreements, the decisions of the Council on Industrial Relations and the Joint Conference Committee decisions on jurisdictional matters could be brought before every contractor, superintendent, general foreman, shop foreman and estimator that was interested.

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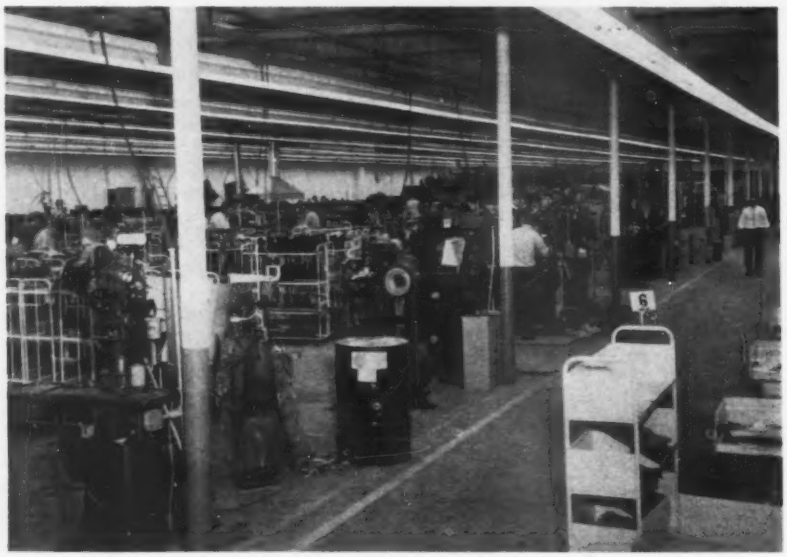
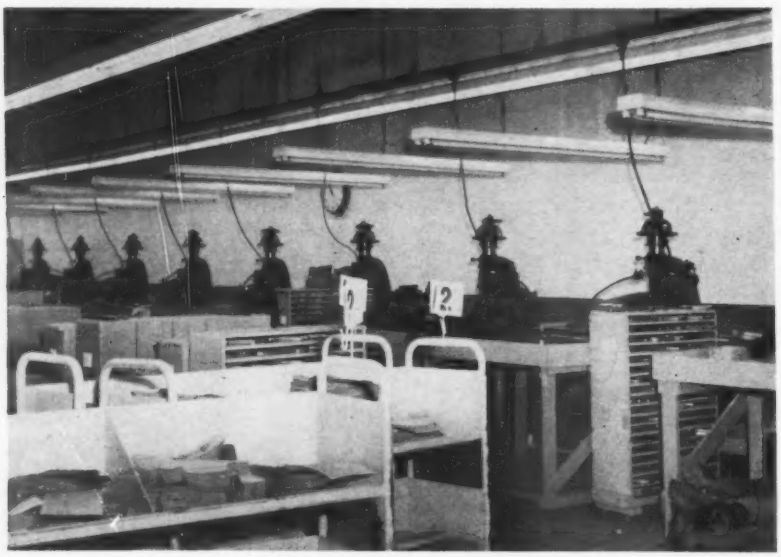
MORE LIGHT TO MAKE HEAVY SHOES

Rows of three-lamp industrial fixtures alternate with rows of trolley duct overhead



Feeder cords from trolley duct feed into conduit stubs down to each motor's control

For additional light at pattern cutters, rows of two-lamp slimlines at right angles



In a shoe it is the last that counts. For the electrical distribution and lighting of a shoe-making plant it was the lasting quality that counted for Kushin's Inc. in its new factory on Cofey Lane, Santa Rosa, Calif.

Makers of shoes and boots for loggers and industrial users, ski and sports boots for outdoor wear, Kushin's plant, a neighbor of Stolting Electric Co. on Second Street, Santa Rosa, outgrew its facilities and needed a new plant. Karl Stolting had been doing the maintenance work for the plant through many years and had been able to save Kushin's considerable by selling and installing a trolley duct system to feed the many sewing and cutting machines. He had likewise sold them on the value of good illumination to speed manufacture, eliminate errors and rejects and promote safety.

When the new plant was planned, Stolting Electric was asked to engineer and install a new system, keeping costs to a minimum in the new place and to make use of as much as possible of existing equipment. Another factor was to be able to make the move without shutting down the plant.

John E. Low Jr., vice president for Stolting, laid out the system for the new plant with a full knowledge of the operations and the needs of the manufacturer. As changes are made in their lines they require a flexible system of distribution and one that will permit the moving of machines or substitution of new ones. Hence, the trolley duct system of distribution offered such advantages.

The new plant was to be of tilt-up slab construction, 240 x 120 ft in size. Feeders were run under the floor slab in conduit from the 1,200-

Wider-range bolted full-tension dead end clamp

This is the new Cat. 302 dead end clamp. It's a companion to the recently introduced 301, with which it shares many common features. A full-tension clamp, the new 302 holds a minimum of 95% of the rated strength of conductors for sizes 2-6/1 to 266.8 18/1 ACSR. When paired with the 301 (handling sizes No. 6 to 2/0 ACSR), the two take the place of *three* previously available clamps for the range of sizes covered. Thus, it is possible to simplify inventories by standardizing on these *two* clamps.

The Cat. 302 clamp is cast in one piece of a high-quality, corrosion-resistant aluminum alloy. The two ½-inch U-bolts are also of high-strength aluminum alloy, which means that all parts surrounding the conductors have equalized coefficients of thermal expansion. The bolts are supplied with an Alumilite 205 finish and grease film. They withstand corrosion and are easy to tighten, since the threads are accurate and smooth. And because the bolts are long, to give plenty of clearance, installation is convenient.

For ease of aligning the cotter pin hole, the galvanized steel clevis pin has a clipped edge. The pulling eye, an integral part of the clamp structure, is large, so it's easy to use the hoist hook.

Off-the-shelf delivery of the new Cat. 302 dead end clamp is available. Your nearby Alcoa-Rome representative can supply information on delivery, price, or the clamp itself.

"Extra-large" accessories

The small compression joint—barely visible here—is a service entrance connector used on No. 2 conductor. The other one is designed for a full-tension splice of 2.32-inch diameter expanded ACSR. Many of today's installations—particularly EHV—require "extra-large" dead-ends, joints, armor rods and other accessory parts. Alcoa meets the need for small, medium, large or even "extra-large" accessories.

→

Stockbridge dampers–Aeolian vibration control

by C. B. Rawlins, Research Engineer, Alcoa Research Laboratories, Massena, N.Y.

The Stockbridge damper is an energy dissipation device removing the energy of vibration imparted to a conductor by wind. It consists of a clamp attached to the conductor and a stranded steel cable connecting a pair of bell-shaped inertia weights to the clamp. Conductor vibration induces a relative motion between the clamp and the inertia weights. This in turn causes flexure of the steel cable, resulting in dissipation of mechanical energy by friction between the strands of the damper cable.

The effectiveness of the damper depends strongly upon how efficiently the vibration motion of the conductor can be translated into the flexure of the damper cable. The damper will dissipate energy for any wind velocity at which vibration of the conductor is translated into sufficient flexure of the damper cable to produce interstrand slipping.

In contrast to most tuned damping devices, which operate best only near their natural frequencies, the Stockbridge damper is designed for efficient transfer and dissipation of energy at frequencies far from its two natural frequencies. In fact, the most efficient performance generally takes place at frequencies which are above the natural frequencies.

Under most field conditions, properly selected dampers, properly spaced, are effective in eliminating damaging vibration. Damper sizes for various conductors are listed in Alcoa catalog DC2A. Spacing rules are specified in the publication "Notes on the Application of Stockbridge Dampers."

For unusual vibration conditions or line construction, special engineering consultation is available through Alcoa-Rome sales offices.

Hydraulic compressor versatility

What types of compressors (and how many of each) are enough? Your answer to both questions depends on the nature and scope of your operations. This is why we offer such a wide choice in compressors. Check the latest published data from Alcoa on this subject; there are five hydraulic compressors alone listed as current. Herewith is a brief run-down.

MODEL 12A • Small and light weight (a mere 11 pounds), it's suitable for ground or aerial operation. Hand operated, it provides a thrust of 12 tons. It features conveniently located controls, adjustable die gap, rapid piston advance and a C-head that's rotatable through 180 degrees.

Model 12HA • This one is also lightweight and has a full 12-ton thrust. Designed primarily for swift installation of ALCOA Tubular Compression Accessories. Its small size and the fact that it can be operated in any position by a remote pump make it well suited for use in close or cramped quarters or with Alcoa's new hydraulic hot stick.

Model 60A • A proven rugged, fast, convenient portable tool for ground or aerial use, it delivers 60 tons of thrust for maintenance or construction with any commercial conductor sizes and tubular accessories. A remote pump can be hand operated or driven by either electric or gasoline power.

Model H2 • With a thrust of 100 tons, this heavy-duty tool is capable of handling a full range of conductors. The compressor can be operated by integral hand pump or with a powered hydraulic pump. The two hand pumps provide a high speed for raising the piston until it contacts the accessory to be installed, and a low speed for closing the dies.

Model H2H • A simplified and lighter-weight version of the H2, this tool can be operated in any position. It is designed specifically for use with a remote pump for extra speed and versatility. Pumps for hand, electric motor, or gasoline engine operation are available.

Summing up: Alcoa's new Cat. 302 dead end clamp becomes a companion to the Cat. 301—together taking the place of *three* previously available clamps.

Extra-large accessories put a wide range of sizes at your disposal.

Stockbridge dampers are designed for efficient energy dissipation over a wide range of frequencies.

Alcoa's broad line of compressors provide the answers to the questions of what type? how many?

Your nearby Alcoa-Rome salesman is eager to supply additional information on any or all of these items. Why not call him today? For the name and address of our nearest representative, write to Rome Cable Division of Alcoa, Dept. ACR-4, Rome, N. Y.

ALCOA
ROME CABLE
DIVISION

amp main switchboard to serve four quadrants of the floor area. For each quadrant lighting and power panels were installed. From these panels conduit up the outer walls and into the rafter area fed four rows on each side of a center aisle of trolley ducts at three-phase, 208 v.

Work was scheduled to finish up one-half of the plant with new duct and lighting fixtures so that one-half of the operations could be moved in one week while the remainder kept operating at the old plant. The following week the second move was made and with it the trolley duct and lighting fixtures salvaged almost totally from the old plant placed in position in the new section. The plant never shut down during the move.

A taste of good lighting had been given the old plant and the management wanted equal or better lighting for the new. There are 12 rows of three lamps each 96-in., 400-ma cool white fluorescent lamps in industrial-type fixtures, which provide an upward component of light. The walls and ceilings have been painted white for utilization of all the reflected light. A level of 120 f-c has been maintained over-all in the plant. At critical seeing areas up to 200 f-c are provided by additional lighting. All lighting is on 120-v circuits. A lesser degree of intensity is used in the warehouse at the rear where bulk storage is maintained.

Where patterns are cut in the leather the addition of two-lamp fluorescent strips with 8-ft slimlines, mounted below the general lighting and at right angles to the main lighting, brings the levels up to 230 f-c. In the old plant windows were found to bring side lighting that created shadows and made seeing more difficult. In the new plant, a windowless one, excellent seeing conditions are maintained.

In the offices at the front of the building the lighting is provided by plastic shielded rafters set in the acoustical ceiling to provide general illumination of about 100 f-c. To reduce the transmission of noise from the plant to the offices the locker rooms and washrooms are placed between the two. Plant offices include that of the superintendent, engineering and operating personnel, a medical facility and personnel rooms.

Because the machines and the lighting provide all the heat that the plant will need provision is made for cooling when the room temperatures reach 75°. Thermostats then operate valves on a roof-sprinkling system, which serves to remove the heat.

One of the four debating teams—John Nanninga Jr., Lewiston contractor, member of Idaho Electrical Board; Chris Klawa, Oregon State chief electrical inspector; Rod Anderson, and E. B. DeFeyter, Spokane contractors—"Journeymen and contractor licensing"

Spokane Contractors, Inspectors Debate

An unusual and very effective way to present both sides of some inspection and contractor problems was used by Inland Empire Chapter, NECA, at its Oct. 20 chapter meeting, to which all of the inspectors of the area and the chief inspectors of three states were invited. The unique feature was to have four debates rather than customary talks or discussion. President Ralph R. Ecker introduced the debating "teams." There were no judges other than the contractor audience. Decisions were not sought but only an exploration of both sides of each subject brought forth.

The teams included John Hewitt, Washington State chief inspector, and Paul Briggs, Briggs Electric, Spokane, on the affirmative and Al Dahlstrom, Spokane chief inspector, and D. G. Quinton, Spokane contractor, negative, on the subject of standardizing code requirements in comparable areas of the Northwest with a "congested area" standard for cities and metropolitan suburban areas under state control and a lower standard for outlying areas and small towns.

Another team debated whether inspectors should always enforce a literal interpretation of the code regardless of extenuating circumstances. On these teams were Larry Martini, Washington State inspector of Kennewick, and Tom Underwood, Ritzville Electric Co., affirmative, and Maurice Anthony, state inspector, Walla Walla, and Frank Gage, Noland-Gage Electric, Walla Walla, the negative team.

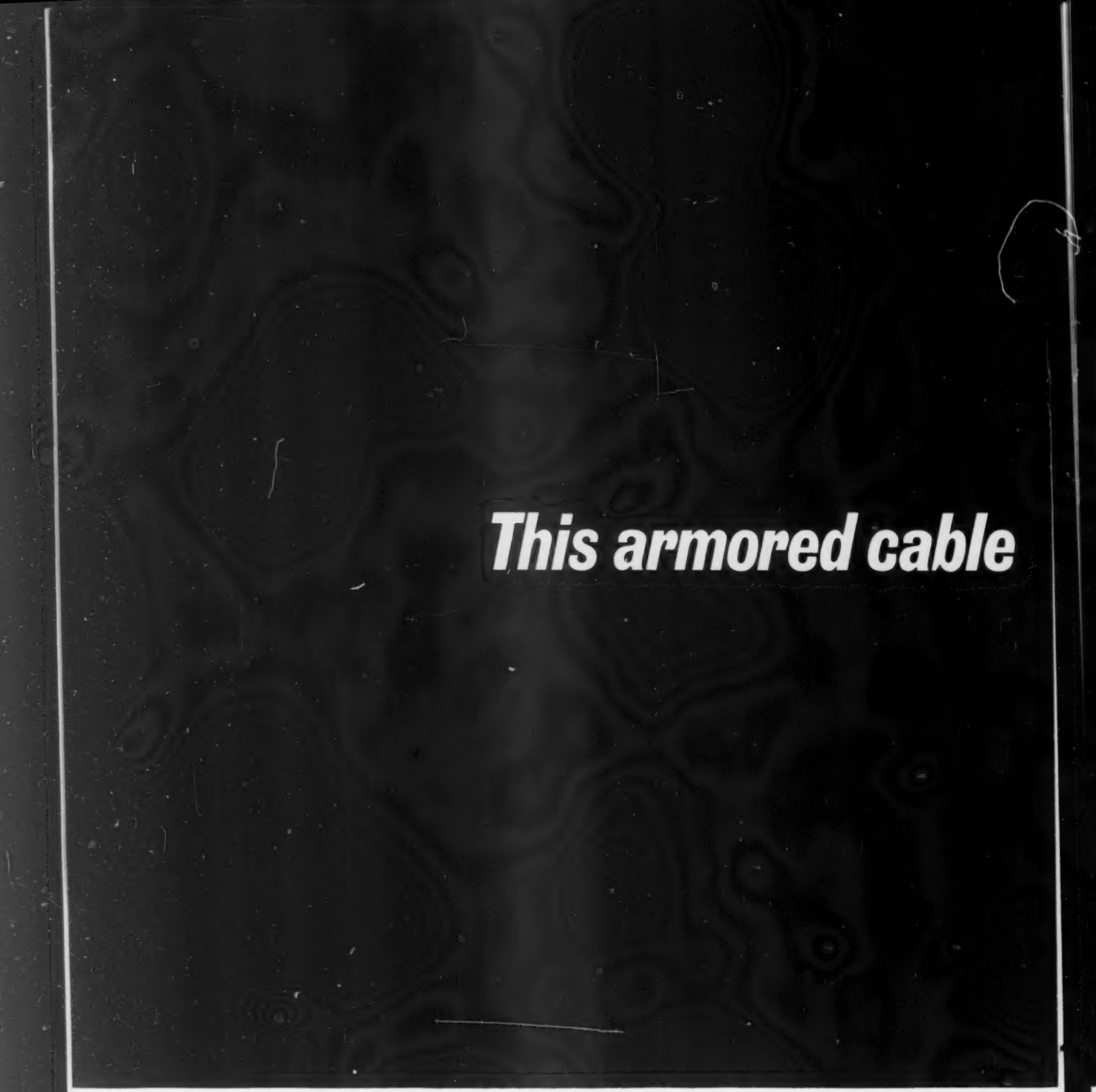
Whether Washington State should have journeyman and supervisor or contractor licensing based on technical competency was debated by the affirmative team consisting of Chris Klawa, Oregon chief inspector, and John Nanninga Jr. of Lewiston, with E. B. DeFeyter, Power City Electric, Spokane, and Rod Anderson, Rod's Electric, Spokane, the negative.

A fourth debate was on "progressively higher code standards should be adopted, such as more metal raceway requirements." On this the affirmative team consisted of Gordon Smith, contractor, and Ward Garrett, Spokane inspector. The negative team was headed by Roy Johnson Jr., Pacific Electric, and visiting W. A. Cyr, ELECTRICAL WEST, was pressed in on the negative side.

The debates stimulated considerable questions afterwards and the meeting was a highly successful one for exploring the interrelations of inspectors and contractors. It was arranged by Robert Wilkinson, chapter manager.

► **New Horizons in Outdoor Lighting** was presented as an outdoor garden lighting show by Incandescent Supply Co.—Phillips & Edwards Electric Corp. at El Rancho Motel, Fresno, in October. The line was previously shown at the 1961 New York Lighting Exposition, and this distributing company is making it available to its customers in the West to view also.

► **Modernity had more appeal** than quaintness to the merchants along a 2.7-mile stretch of Thousand Oaks, Calif., who tried to sample installations of both mercury-vapor street lighting and gas lights. The idea that a "distinctive atmosphere" would be given the streets, such as in Scottsdale by gas lights, was turned down by the Retail Merchants Assn.



This armored cable

All it takes is one heavy blow to damage suspended rigid conduit but USS Tiger Brand Armorlokt Cable rolls with a punch. Because Armorlokt is flexible, it rolls or gives under pressure without damage. It's not often that you need this built-in "give," but it's there and it can prevent cable failure. Armorlokt protects in other ways, too. Corrosive atmospheres are no problem. You can have the cable armored with galvanized steel, stainless steel, aluminum or bronze. Ampyrol (PVC) jackets in color for easy identification are also available. And USS Armorlokt Cable installs as easily as ordinary cable—in one-half the time it takes to install rigid conduit. You can have the type insulation that best fits your actual job

requirements—varnished cambric, rubber, or asbestos in sizes up to four inches in diameter—ratings up to 15,000 volts. There's a standard USS Tiger Brand Cable for every special job. Write for the Armorlokt catalog. American Steel and Wire, Dept. 1447, Rockefeller Building, Cleveland 13, Ohio.

USS, Armorlokt, Tiger Brand and Ampyrol are registered trademarks.

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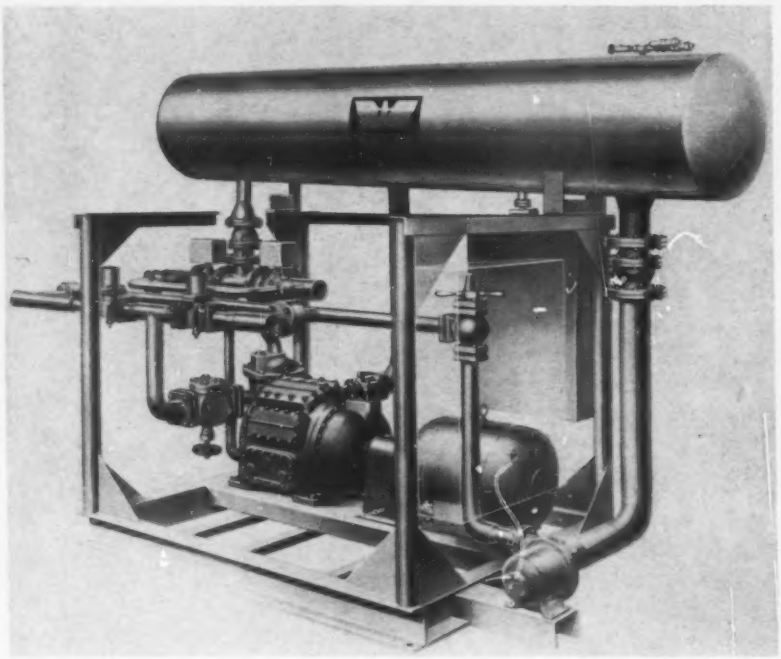
PRODUCT NEWS

New designs and applications



Heat Pump

Worthington Corp.

A new line of commercial heat pumps designed for year-round operation and developed specifically for use in the 20- to 300-ton commercial field has been developed by this company's Air Conditioning Division. The units are said to utilize a reliable, simple economical design that eliminates three- and four-way valves, oil separators and oil receivers and a multitude of refrigerant specialties.

The units are available in both air-to-air and air-to-water operation and feature a pump based on positive forced feed circulation of the refrigerant through the respective summer or winter evaporator, requiring no critical superheat control settings.

Circle No. 1

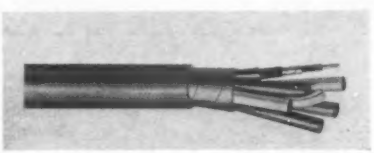
Signaling Device

Edwards Co. Inc.

A new signaling device that transmits audible coded signals from remote locations over a nearby existing telephone installation has recently been introduced.

In operation, the remote substation (which is equipped with a conventional telephone) is dialed from any standard telephone at any convenient location. At the receiving end a special relay causes the new signaling device to become activated and connects the telephone hand set to the line. The signaling unit, in turn, monitors the electrical equipment at the substation and transmits predetermined codes via audible signals which are heard by the person calling. Information is transmitted back to the calling party via telephone company wires and regular central office equipment. In effect, the unattended substation literally has "answered a telephone call, and told the caller what he wants to know."

Circle No. 2



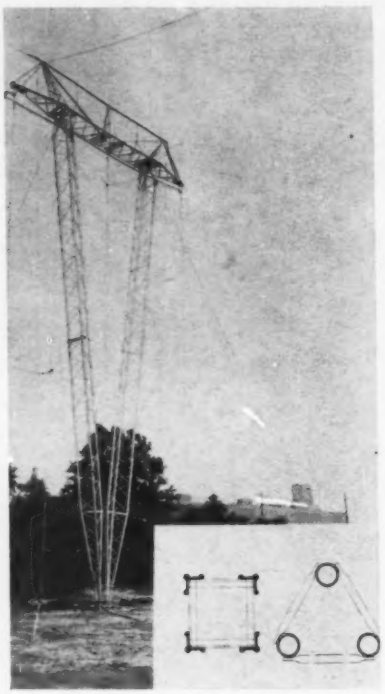
Asbestos Control Cable

Western Insulated Wire Co.

Multiple conductor asbestos-insulated type AVA control cables for operation in temperature as high as 110 C are now offered by this company in sizes 12 and 9 AWG with up to 19 conductors.

These cables will find wide application in boiler rooms, power plants, steel mills, foundries, glass and ceramic plants and in any installation where they are exposed to high temperatures, oils, corrosive vapors and flame, according to the manufacturer.

Circle No. 3



Aluminum Transmission Tower

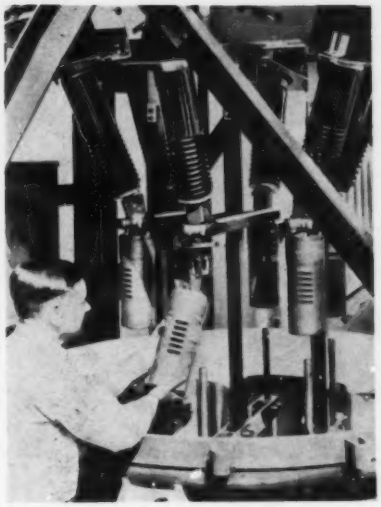
Michael Flynn Mfg. Co.

This company announces the design of a new and improved type of guyed V aluminum power transmission tower.

The structure is said to take advantage of extruded tubular sections rather than extruded angles to construct the legs of the towers. This design is also said to use the triangular, rather than square cross-sections, for leg construction.

The company claims that the advantage of this type of tower construction is that it saves 20% in weight and gives a 25% reduction in the number of pieces needed for the tower.

Circle No. 4



Single-Tank 69-Kv Breaker

I-T-E Circuit Breaker Co.

The Power Circuit Breaker Division of I-T-E has announced a new design, compact, single-tank, 69-kv subtransmission oil circuit breaker.

This design is said to incorporate the advances of the company's Kool-Arc vertical interrupter for efficient, safe three-phase interruption in one tank.

Circle No. 5

Plastic Electrical Boxes

Kraloy-Chemtrol Co.

Twelve new series of plastic electrical boxes have been added to the line of rigid plastic (polyvinyl chloride) conduit and fittings already manufactured by this company, it was recently announced. The company says these new boxes greatly increase the applications for PVC for conductor protection.

With superior anticorrosive characteristics of PVC, these boxes are expected to stand up in areas of corrosion which create safety and maintenance problems with other types of materials.

Circle No. 6

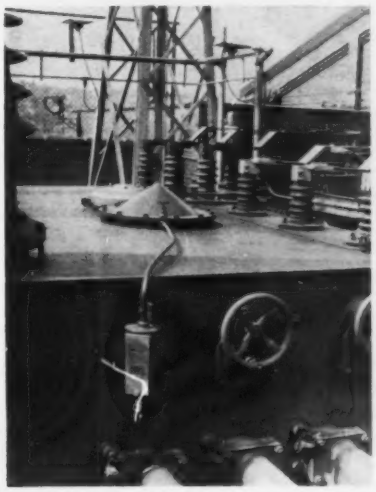
Aluminum-to-Steel Welding

Metals & Controls Inc.

To overcome the problem of welding aluminum directly to steel, Metals & Controls Inc. has announced the development of an aluminum-clad, low-carbon steel. The clad metal, with aluminum on one side and steel on the other, is used as an intermediate or transition material to weld the steel side of the clad metal to steel and the aluminum side of the composite material to aluminum.

The company says conventional methods of welding are adequate.

Circle No. 7



Water Remover

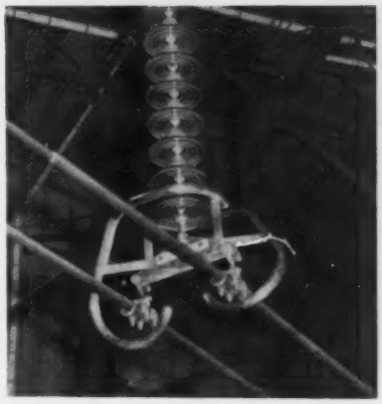
Westinghouse Electric Corp.

Condensaire equipment for condensing and removing water and volatile acids from transformers is available from this company.

The equipment reduces the deterioration of oil, maintains dielectric strength and retards corrosion in both older-type free-breathing and modern sealed transformers, according to the manufacturer. In removing the moisture and certain volatile organic compounds formed by oxidation, the insulation is protected and the life extended.

The equipment is said to consist of a metallic inverted cone-shaped hood assembly, which can normally be bolted on the existing hand-hole cover boss. A heavy gasket insulates this hood from the main transformer cover so that it is always cooler than the main cover.

Circle No. 8

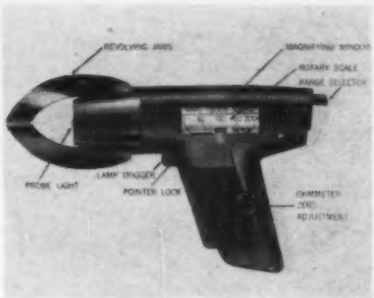


Grading Device

Lapp Insulator Co. Inc.

A new grading device with improved corona control characteristics for 345-kv transmission has been developed by this company. The design consists of two tubular aluminum sections in a configuration that combines effective shielding with neat, functional appearance and is said to successfully control corona at the 345-kv operating level and to minimize the RIV of the line.

Circle No. 9



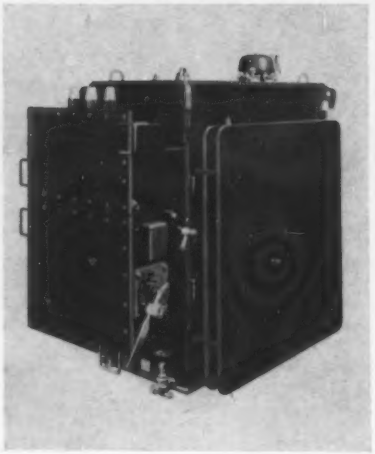
Portable Meter

Federal Pacific Electric Co.

Attempting to reduce the difficulties in measuring current, voltage and resistance, this company has introduced a lightweight, one-hand operable Pistolmeter.

The revolving jaws at the muzzle end of the Pistolmeter permit their insertion into cramped gutters and cable boxes at any convenient angle and the trigger-operated probe light at the meter's end ensures safe, easy handling. A locking device on the meter pointer enables the user to make his reading after the Pistolmeter has been removed from the tested conductor.

Circle No. 10



Network Transformer

Kuhlman Electric Co.

A completely redesigned line of smaller, lighter network transformers has recently been announced by this company.

In units of 15-kv and below, high-voltage coils are wound directly over the low-voltage windings; disc-type coils are used above 15 kv to achieve reductions in size and weight in comparison with conventional designs, according to the manufacturer. The new network transformers are thoroughly sealed and protected against corrosion to withstand flooding and underground conditions and are said to be equipped with a disconnecting and grounding switch, with built-in interlocks. The transformers are available in 5-kv through 34.5-kv ratings.

Circle No. 11

Mastic Connector Cover

A. B. Chance Co.

A Mylar-backed mastic compound for use in covering electrical connectors has been developed by this company. The pads are said to protect the connection from erosion, dirt accumulation and chemical attack. The compound is weather resistant and does not become brittle or flow with temperature in the range of −50 F to 250 F. The Mylar provides an added safeguard against puncture during installation and provides an electrical insulation level of 1,000 v per mil.

Circle No. 12

Enclosed Cutout

Westinghouse Electric Corp.

An extended line of enclosed fuse cutouts with fault interrupting ratings up to 20,000 amp has been announced by Westinghouse. Increased rating of the new cutout is said to be achieved through the use of glass fiber fuse tubes which replace the standard paper fuse tubes used in lower ratings.

Circle No. 13

Latch-In Fault Indicator

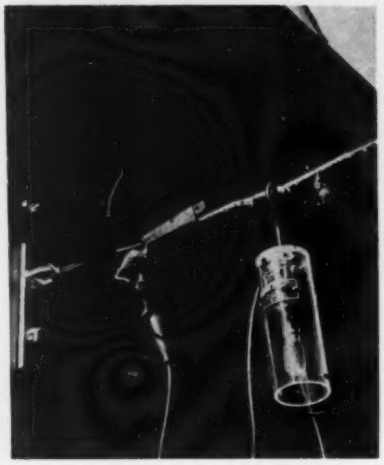
Minneapolis-Honeywell

A new ¾-in., sealed miniature magnetic latch-in fault indicator—available in wide current and voltage ranges—has been developed by this company's Precision Meter Division.

The indicator is said to include a disc-type flag, which may be color coded or imprinted to designate the function being monitored, that rotates behind a sector window. When unenergized, the flag is magnetically held in the off position.

Circle No. 14

For more information fill in coupon . . . p 71



Testing Device

HD Electric Co.

A new service entrance testing device, the Test-M-Lite, is currently being introduced by this company. This push-button instrument, designed for use up to 240 v, will determine, before connecting a customer's service, whether there is an unintentional load or merely a metal potential coil load. Two connectors project from the safety lamp in the handle of the instrument. One is hooked to a service conductor and the other to the secondary feeder. A red button at the base of the lamp is pushed. If the lamp lights up, a load is indicated. No light means the service is o.k. to connect.

Circle No. 15

Oil Switch

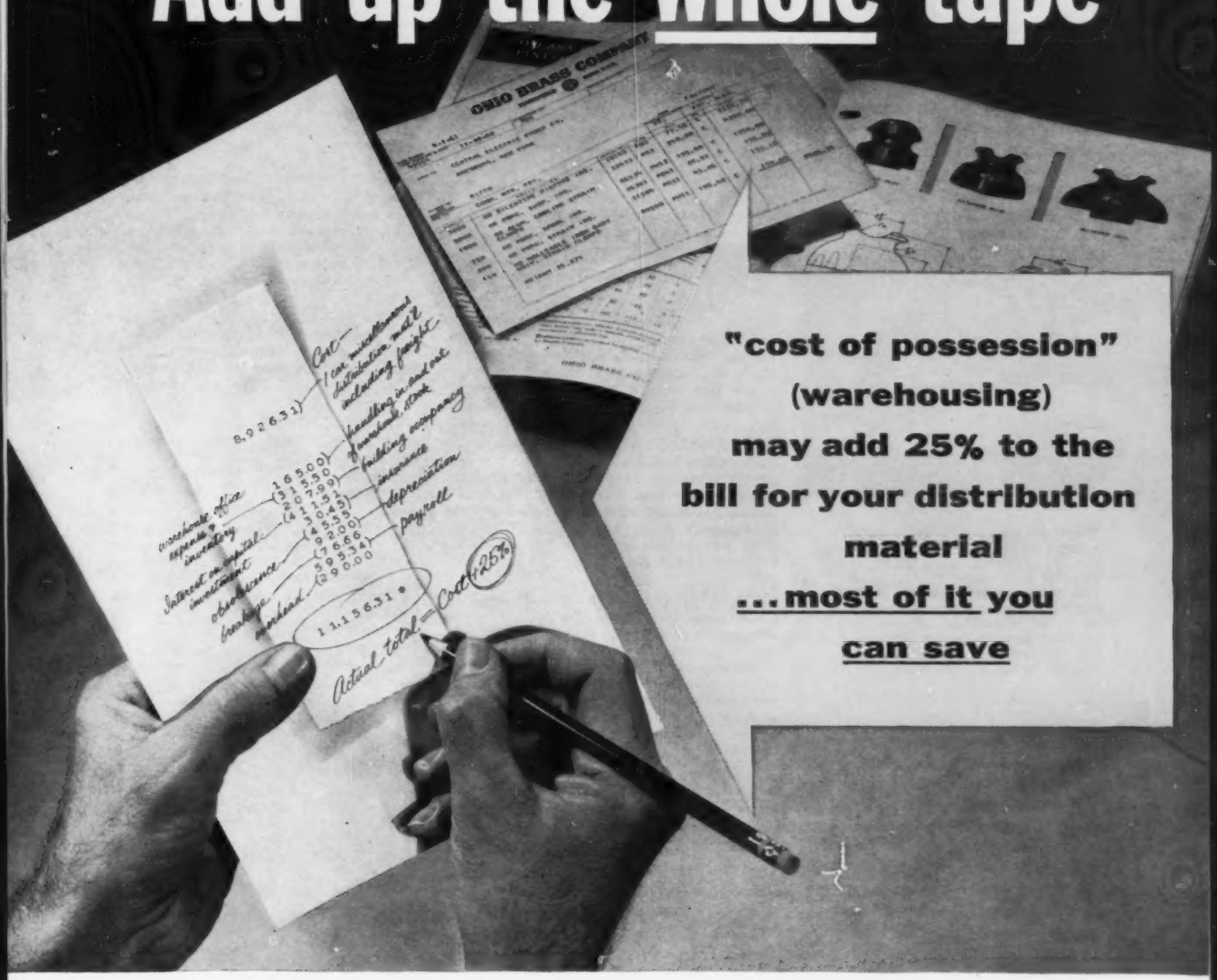
Allis-Chalmers Mfg. Co.

Introduction of a new watertight, subway-type, three-pole oil switch (M-35) to meet the growing trend toward heavier underground systems and interconnections, and the larger available currents, has been announced by Allis-Chalmers.

The new 5-kv, 300-amp switch is able to withstand momentary and short time currents to 25,000 amp. It has porcelain insulators, laminated copper brushes and stud and contact blocks. The new nonautomatic subway oil switch, designed for disconnect service on underground distribution systems, is suitable for wall mounting, manholes and in subways for sectionalizing of lines, switching transformers and similar services where positive and safe operation is necessary without frequent adjustment and inspection.

Circle No. 16

Add up the whole tape



"cost of possession" (warehousing) may add 25% to the bill for your distribution material ...most of it you can save

Buy a carload of distribution material. Mail out your check. Is it paid for? Not by a long shot!

Some people have been shocked when they totalled up what looked like a smart buy, only to discover the warehouse ate up perhaps five times what they saved.

Reliable sources report that cost of possession often reaches 25 per cent, and is rarely below ten per cent with realistic accounting.

Most of this you don't need to spend. In nearly all principal centers there is a Graybar warehouse. This organization will stock the type of material you need and maintain agreed minimums. They will do it without obligation and without extra charge. They will deliver the material when you need it - - as you need it. On at least a major portion you can save 10 to 25 per cent through the efficient facilities of Graybar.

Where else can you strike a better bargain and, as a bonus, get the finest distribution hardware, insulators, and lightning arresters on the market - - O-B?

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

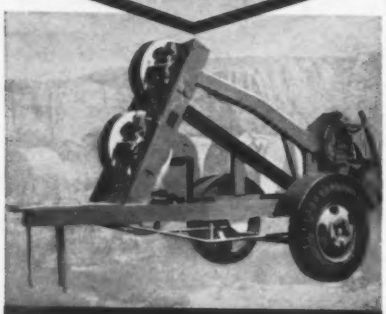
HOLAN

Distributed by Graybar Electric Company

10139-H

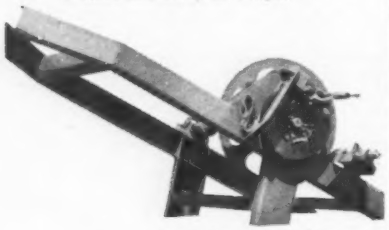
Now—Convert your own Reel Dolly to a Bullwheel Tensioner WITH A

PENGO 5000-U Assembly



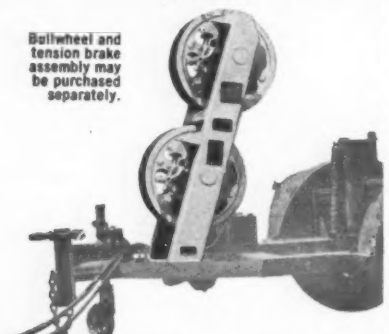
5000-U assembly installed by City of Medicine Hat, Alberta, Canada

Here's an easy way to build up a modern bullwheel tensioner at low cost—simply install a PENGO 5000-U Bullwheel Assembly to your old trailer or reel dolly. You'll have a tensioner with Neoprene-lined 26" bullwheels, capable of handling practically any distribution line stringing job at tensions to 2,000 lbs. at up to 4 mph.



Support arms, reel spindle with reel brake, and hand rewind assembly. 2⅜" spindle will handle reels to 75" diameter, 44" width unless reduced to fit your trailer.

Bullwheel and tension brake assembly may be purchased separately.



We invite you to write or wire for literature, prices—please address Dept. 14.

PETERSEN ENGINEERING COMPANY, INC.

Santa Clara, California

16 Phone: AXminster 6-7712

MANUFACTURERS' LITERATURE

For fast action in securing the manufacturers' literature listed below and more information on new products described in the preceding pages, use the coupon below. Circle the items wanted and mail to Electrical West

SWITCHGEAR—A three-color, 40-page bulletin from I-T-E describes that company's new-design 4.16- and 13.8-kv circuit breakers and switchgear, including details on such major features as the stored-energy closing system, face-wound blowout coils and closed-door drawout. Drawings, sketches, photographs, specifications and charts are an aid to designers, architects and application engineers. For 2800-2B *circle No. 17.*

CONTACTORS — A new 12-page publication, GEA-7316A, describes General Electric's complete line of contactors and starters for air conditioning, refrigeration and resistance heating applications. This bulletin includes information on the new 20-, 25- and 75-amp forms, which were added to the line recently to supplement the 30-, 40-, 50- and 60-amp devices. *Circle No. 18.*

NUCLEAR INSTRUMENTS—General Electric's bullentin GEA-7259 describes the company's complete range of nuclear instrumentation services. A typical reactor control system illustrated in the eight-page bulletin incorporates many of the individual nuclear instruments available for immediate delivery. *Circle No. 19.*

PRESERVATIVES—New data sheets from the Utilities Division of Osmose Wood Preserving Co. describes two internal groundline treatments for standing poles or piling where externally applied preservatives cannot be expected to penetrate. According to the manufacturer, Aldrin, a very strong insecticide, has been added to the Hollow Heart treatment. For a copy of the data sheet and price schedule, *circle No. 20.*

COVER — A new patented outlet protector cover, called Code Cover, is described by Appleton Electric Co. in a pocket size brochure. According to the manufacturer, Code Cover is a nonrusting metal outlet protector cover and locator, with a patented tablet of dye that penetrates wet plaster to indicate all outlets. It fits all standard 3x2-in. switch boxes and industry standard outlet box covers. The new unit snaps into the outlet opening, keeping it clean and fully protected while plastering. A tiny spot of color then brings out the exact location of every hidden outlet. For a copy of this brochure, *circle No. 21.*

INSULATION—A selection chart containing samples of 15 different Dutch Brand insulating tapes with physical and electrical data is available from Johns-Manville. For a copy of bulletin DB-70A, *circle No. 22.*

STREET LIGHTING — Revere Electric Mfg. Co. is offering an eight-page bulletin on its 2600 Series Endoval street lighting luminaire. The unit is designed for 250- or 400-w mercury lamps. *Circle No. 23.*

INFRARED OVENS—The full line of Radcor standard temperature-rated electric infrared ovens for industrial applications is covered in a new 16-page catalog. Vertical and horizontal models with prices, including controls, are listed. *Circle No. 24.*

CONDUIT — Telec-Con plastic conduit is described in a brochure offered by Southwestern Plastic Pipe Co. Features, uses and technical reference data are included. For a copy *circle No. 25.*

WIRES—A new catalog from Hitemp Wires Co. gives complete data on the manufacturer's line of high-temperature wires, cables and tubings. For a copy *circle No. 26.*

ELECTRICAL WEST *Not good*
255 California St., San Francisco 11, Calif. *after February 1*

Please send me, without obligation, the new product information or catalogs.

If described in Product News, circle item number

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

If described in advertising, fill in page number

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

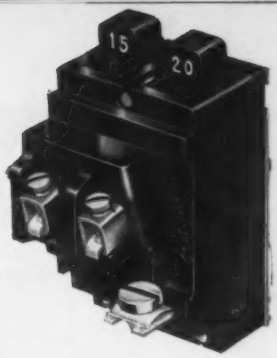
*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

KNOW YOUR SYMBOLS

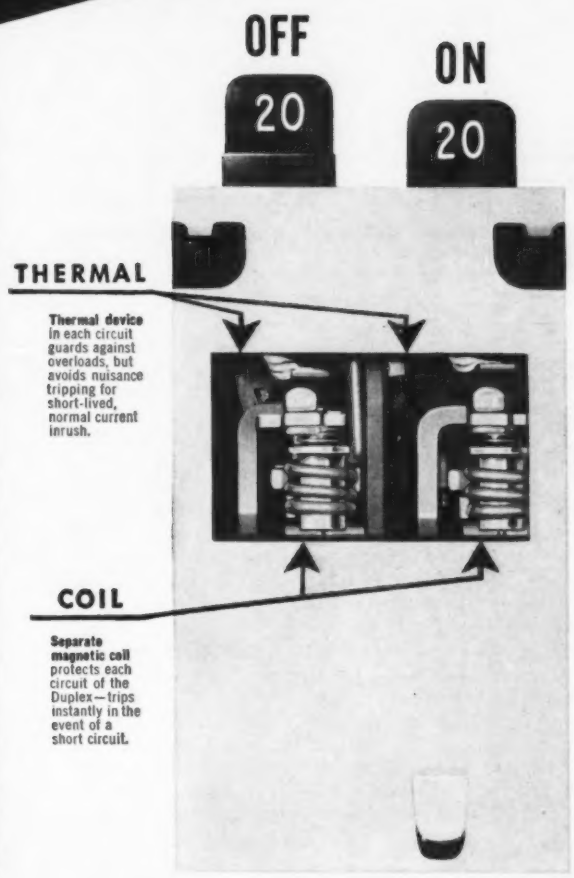
This symbol stands for circuit breaker

This symbol stands for QUALITY

BullDog Duplex Pushmatic—



Still the leader in residential safety and convenience!


OFF
20
ON
20
THERMAL
Thermal device in each circuit guards against overloads, but avoids nuisance tripping for short-lived, normal current inrush.
COIL
Separate magnetic coil protects each circuit of the Duplex—trips instantly in the event of a short circuit.

The leader in safety . . . BullDog's Duplex Pushmatic® circuit breaker provides two protective systems in each circuit. A thermal control teams up with a magnetic coil to assure maximum protection under *any* residential operating condition and to avoid nuisance tripping. Bolted bus-bar connection assures tight, positive contact that prevents overheating. This maximum electrical safety is your best protection against costly trouble calls!

The leader in convenience . . . the Duplex Pushmatic puts two general-purpose circuits, 15 or 20 amps, in the panel space of one—provides maximum circuit flexibility with smaller, less expensive panels. And the Duplex is the *only* breaker with exclusive pushbutton convenience. Also, a tripped breaker can be identified instantly by sight or touch, resets with a push of the finger. For complete details on Pushmatic breakers and panels, write for your "Pushmatic Pocket Guide"—*it's free!*

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Mich. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N. Y.

Consult the following Pacific Coast representatives:

Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7866
Portland 12, Oregon

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

Safety Switchboard Company
910-89th Avenue
Oakland 21, California

BullDog Elec. Prod. Co. of Los Angeles
3020 Supply Ave.
Los Angeles 22, California

I-T-E CIRCUIT BREAKER COMPANY
BULLDOG ELECTRIC PRODUCTS DIVISION

CABLE NIGHTCAPS

Seal Unfinished Cable Joints Against Moisture And Dirt

Cable splicing no longer need be one continuous operation when G&W Cable Nightcaps are used. Unfinished cable joints or terminations can be left overnight or for several days at a time with complete assurance that work will remain dry and clean as when sealed.

The G&W Cable Nightcap consists of a heavy plastic sleeve, waterproof paper to keep the plastic clean, tape, desiccant, and humidity indicator. The sleeve is slipped over the unfinished joint and one end taped tightly to the cable. Desiccant and humidity indicator are then inserted into the sleeve and its remaining end taped to the cable on other side of the joint. Waterproof paper is laid over the sleeve for protection.

Further information on the Cable Nightcap is available from G&W Electric Specialty Company or consult your local G&W representative.

G&W ELECTRIC SPECIALTY COMPANY
3506 WEST 127th STREET • BLUE ISLAND, ILLINOIS
CANADIAN MFR. • POWERLITE DEVICES, LTD.
TORONTO, MONTREAL & VANCOUVER

Superior quality standards—inspired specialized design J61-1

Keeping line clearance costs DOWN goodwill UP

Proven power equipment and Davey trained rope climbers... that's what makes Davey Surgical Line Clearance so economical. Utilities can rely on the dependable, efficient, and *adaptable* Davey crew. It will pay you to talk over your tree maintenance problems with the West's leading line clearing specialists—Call Davey.

DAVEY
TREE SURGERY CO., LTD.
OF CALIFORNIA

SAN FRANCISCO • Russ Building
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LATE NEWS

Continued from page 65

Wage Rise Advice Given

Wage rates in the Oregon area served through Local Union 48, IBEW, will go up Jan. 1 and July 1, 1962, from their present rates to $4.25 in January, $4.35 in July and with some changes in regard to shift work. In announcing the changes, Robert P. Burns, manager of the Oregon-Columbia Chapter, NECA, made these pertinent comments: "How you look upon these amendments depends entirely on you and who you are and what you do. The higher wages, the alterations in working conditions all end up to spell MONEY. Employees will receive more money in their pay checks. Employers will pay more in each pay check. Uncle Sam will receive more in taxes. In order to pay more, employers must charge more. Higher charges will mean higher construction costs in our industry. This, in turn, means higher cost to our customers for the products or services that they produce for the public. What's in it in the future—perhaps more money out of everyone's earnings for the goods and services provided by our Oregon to the people in it.

"What have we gained? Improved management-labor relations? More effective construction methods? A higher standard of living? More efficient work to offset the rising cost? We hope a little of each."

► **A 10¢ hourly wage boost** across the board was given by some 26 Los Angeles electrical motor repair firms when they signed a one-year agreement with Local 11, IBEW, in Los Angeles. Brief picketing against three of the firm had occurred in mid-October before a settlement resulted. Those picketed were Larsen-Hogue, Smallcomb Electric Co. and Bear State Electric.

► **A "Burn a Light at Night" campaign** began in Los Angeles County Nov. 1 as a crime prevention move sponsored by the County Sheriff's department. Its aim is to get all residences, business and industrial plants to keep lights burning at night to discourage burglars and criminals. Sheriff Peter Pitchess said that similar campaigns in other parts of the country have reduced crime rates as much as 50%.

look for this marking...

...and this tag
on every bundle

Your assurance of top protection against corrosion... of faster and better conduit installations

The new SPANG Blue Star Galvanized Rigid Steel Conduit now has the regular hot-dipped galvanized coating *plus* a second galvanized coating for extra protection against corrosion!

Threads are uniformly galvanized on every ridge and valley for easy coupling. No excess zinc to chase off . . . no bare spots. It's the best thread protection available against corrosion.

Double coating on the conduit inhibits rust formation. Finish won't flake off. Provides fine appearance in exposed locations.

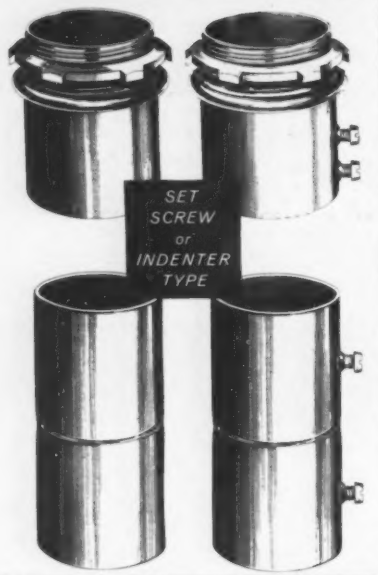
Easier handling, too. SPANG Blue Star Conduit is bundled with steel strapping in sizes up through 1½". Shipped in one-ton lifts for fast handling by lift truck, easy inventory.

You owe it to yourself to try new SPANG Blue Star Conduit. Get complete details from your nearby SPANG Distributor.

SPANG Blue Star Conduit is one of the many fine products produced by *National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.*

ARMCO National Supply Division

ETP
U.L. SOLID ONE PIECE • CONCRETE TIGHT
E.M.T.
Electrical Fittings



Why settle for ordinary couplings & connectors when ETP gives you all these EXTRAS:

- Sparkling corrosion-resistent zinc chromate overplating for lasting performance.
- One piece tubular steel — cannot open or spread.
- Concrete tight. Far surpasses ULL. File Card E 24788.
- Exclusive pre-set, deep-slotted staked heavy duty locknuts.
- Special formula soft steel for easiest indenting.
- Competitively priced! Boxed every size from ½" to 2"

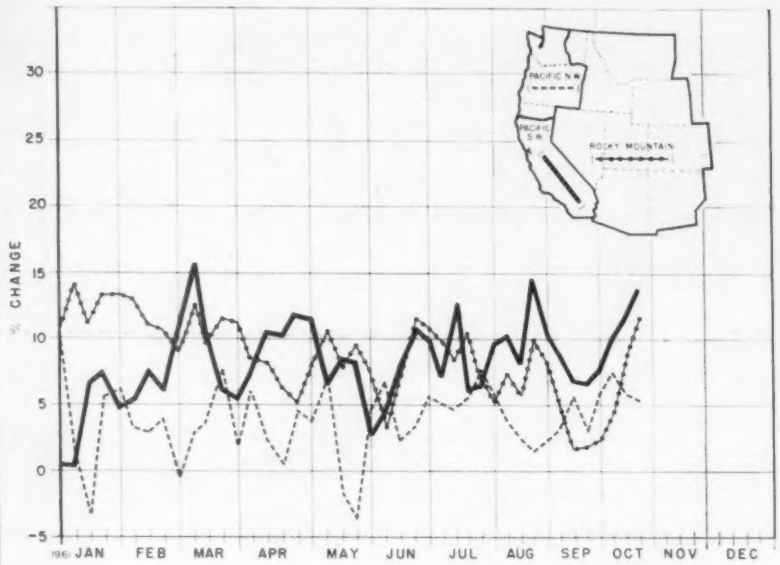
CONNECT WITH ETP FOR ECONOMY

Electrical Tubular Products, Inc.
74-16 GRAND AVENUE, MASPETH, (N.Y.C.) N.Y.
DEtender 5-8000

WESTERN BUSINESS TRENDS

Output Comparisons

Year-to-Year Kwh Output Changes. Per Cent Change Over Same Week. One Year Ago for Region as Indicated in Keyed Map



Electrician's Wage Scale

Shown are union hourly wage scales for electricians in selected cities in the 11 Western states. These scales represent the minimum wage rates (excluding holiday and vacation payments, regularly made or credited to the worker each pay period) agreed upon through collective bargaining, effective July 3, 1961

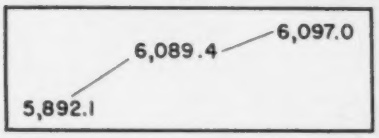
RELATIVE WHOLESALE PRICES OF ELECTRICAL MATERIAL

	LATEST MONTH	PREVIOUS MONTH	YEAR AGO
Wire and cable	131.1	131.2	131.3
Watt-hour meters	118.6	118.6	120.9
Hydro generators	185.5	185.5	185.5
Steam generators	175.5	175.5	203.5
15-kva transformers	130.0	130.0	133.0

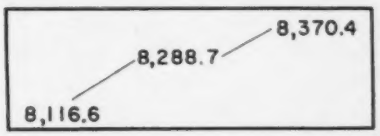
& INDICATORS

Economy at a Glance

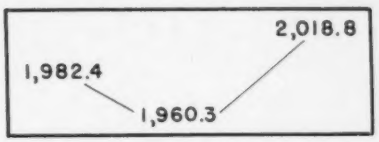
Year Ago	Month Ago	Latest Month



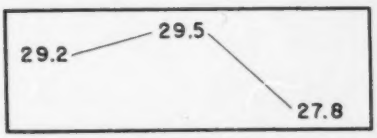
PERSONAL INCOME in millions—seasonally adjusted as of November 15 (An index of consumer spending potential)



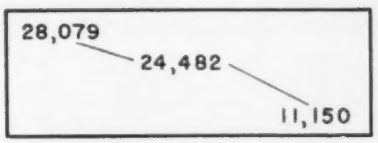
NONFARM EMPLOYMENT in thousands (Index of industrial, commercial activity)



MANUFACTURING EMPLOYMENT in thousands (A measure of manufacturing activity)



HOUSING STARTS in thousands of units (Index of new residential customers)



INDUSTRIAL BUILDING CONTRACTS in thousands of dollars (A rough index to the dollars of electrical contracting business six months to a year ahead)

Unusual employment opportunity for experienced

ELECTRICAL ENGINEERS WITH ELECTRIC UTILITY IN THE GROWING SOUTHWEST

Expanding electric utility needs Electrical Engineers with B.S. Degree. Minimum of 5 years utility experience of which 3 years shall have been in Transmission Design for Construction. Growing community offers dry, sunny climate, mild winters, progressive schools, attractively priced housing. If you have considered moving your family to a healthier climate, send complete resume of experience, references and present salary. Write Electrical West, Box 322, 255 California St., San Francisco 11, Calif.

ROYAL Portable Cords and Cables

Satisfy all your requirements . . . whether for extra heavy duty Type W power cable or light, flexible Type SJ cord.

Yes, one call gets them all! All types and sizes in all kinds of jackets . . . rubber, neoprene or thermoplastic. Lamp cords, fixture or machine tool wire . . . thermo or coaxial cables. All ROYAL and reliable!

Ask for them by brand name from your wholesaler . . . or write for our catalog, giving your wholesaler's name.

ROYAL ELECTRIC ...an associate of IUT

ROYAL ELECTRIC CORPORATION
PAWTUCKET, RHODE ISLAND

In Canada:
Royal Electric Company (Quebec) Ltd., Pointe Claire, Quebec

the conduit that saved 10%

What happened at Strick Trailer Company's new plant in Philadelphia when almost two miles of Alcoa® aluminum electrical rigid conduit was installed?

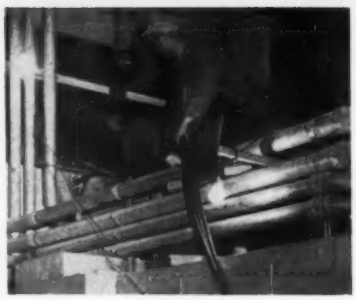
The cost was approximately 10% less than to do the same job in steel.

The reason? Fewer man-hours are required to install aluminum conduit. Based on figures published by NECA in 1959, installation of 100 feet of 4-inch aluminum conduit under a 12-foot ceiling takes 17.5 man-hours; the same installation in steel requires 30 man-hours. In this case, it takes 71% more labor units to install steel.

Aluminum weighs 66% less—pounds that never have to be loaded, unloaded, hefted and suspended. And Alcoa aluminum conduit bends easily, with little or no springback. It is easy to cut and thread; in fact, some studies show labor savings as high as 50% for cutting threads.

Since aluminum is inherently resistant to corrosion, service life is often longer, too, particularly in corrosive environments. No protective coating needed to prevent corrosion. No routine painting required to preserve its usefulness.

How much can you save? The actual dollars depend, naturally, on the nature of your installation. For the complete story, contact your Rome-Alcoa representative. Or write to Rome Cable Division of Alcoa, Dept. 4-121, Rome, N. Y.



SAVED 10% by installing Alcoa aluminum conduit instead of steel at Strick Trailer Company's new Philadelphia plant.

Conforms to ASA C80.5-1960—Rigid Aluminum Conduit and Federal Specification WW-C-540a

ALCOA
ROME CABLE
DIVISION

Proposed Western Projects

Alaska and Hawaii

Fairbanks, Alaska, State Public Works Dept., airport terminal, $2,500,000. Plans by Gray, Rogers & Osborne.

Hawaii, Japan-American Telephone & Telegraph Co., New York, communications cable via Midway, Wake, Guam to Japan, $55 million.

Palmyra Island, Polynesian Paradise, residences, hotel, clubs, etc., $2,000,000. In care of Mercury International Co., Los Angeles, Calif.

Rocky Mountain

Colorado Springs, U. S. Engineers, Omaha, Neb., Norad headquarters, $10,400,000.

Longmont, School Dist. 17, school, stadium, etc., $3,000,000. Plans by Bunts & Kelsey, Colorado Springs.

Loveland, School Dist R2J, two schools, $3,256,000. Plans by Wheeler & Lewis, Denver.

Moscow, Idaho, University of Moscow, dormitories and cafeteria, $5,165,371. Plans by Wayland & Cline, Boise.

Helena, Mont., Permanente Cement Co., plant, $10 million.

Salt Lake City, City Municipal Corp., library, $2,500,000; Edwards & Daniels, architects. Public safety bldg., $10 million; Roy McLeese, city engineer.

Pacific Northwest

Victoria, Westward Ho, apartment-hotel, $6,000,000. In care of A. C. Smith & Associates, consulting engineers, Vancouver.

Berkeley, Calif., University of Calif. Regents, college of environmental design, $4,500,000. Plans by De Mars, Esherick & Olsen, San Francisco; Isadore Thompson, San Francisco, consulting engineer.

Mountain View, International Business Machines Corp., research center, $2,700,000. In care of Hellmuth-Obata & Kassabaum Inc., St. Louis, Mo., architect.

Newark, Elementary School Dist., schools, $6,750,000. Falk & Booth, San Francisco, architect.

San Francisco, Public Utility Commission, garage at airport, $18 million. Plans by Gould & Degenkelb and Edward B. Page.

Santa Cruz, Barrett Homes Inc., apartment development, $4,500,000. Plans by Donal Haridson & Associates, Richmond.

Pacific Southwest

La Jolla, Scripps Memorial Hospital, hospital, $5,500,000. Plans by Charles Luckman & Associates, Los Angeles.

Los Angeles, Harbey & Barney Morse, California Mart, including 13- and 20-story office, 16-story hotel, bank, 2-story motel, etc., $50 million. Plans by Victor Gruen & Associates, Beverly Hills.

Los Angeles, Martin Lowitz, design center, $3,000,000. Plans by Richard Dorman Associates, Beverly Hills.

Mojave, American Potash & Chemical Co., plant, $15 million. C. F. Braun & Co., Alhambra, consulting engineer.

Northridge, State Architecture Div., Sacramento, San Fernando Valley State College, administration-classroom bldg., $3,400,000.

Mercury, Atomic Energy Commission, Germantown, Md., test site bldg., Jackass Flats, $6,000,000. Plans by Vitro Engineering Co., architect-engineer, New York.

BECHTEL

San Francisco

Power and Industrial Division offers immediate employment opportunities for electrical, mechanical, or structural engineers capable of assuming responsibility on design of major steam or hydro power plants.

Relocation allowances cover moving costs plus transportation reimbursement for you and members of your family. If you have an interest in a San Francisco assignment, please send a resume of experience to W. A. Anderson, Technical Recruiting. Personal interviews will be arranged for qualified candidates.

Bechtel
Corporation
220 Montgomery Street
San Francisco, Calif.

In New York City, a personal interview can be arranged by phoning Edmund J. Orr, MUrray Hill 7-7100

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

EVERSTICK ANCHORS

For new construction and maintenance — Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resiliant, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

THEY STAY ON.....
All VICTOR "MAGIC" CLAMPS and STRAPS for Thin and Heavy Wall Conduits have this time-saving snap-on feature.

Contractors everywhere are switching to VICTOR. Cash in on this heavy demand. Add these fast selling, profitable Clamps and Straps to your line.

Write for the new Victor Strap Catalog. Lists over 600 items to fasten Wire, Cable, Tubing and Conduit.

VICTOR SPECIALTIES, INC.
775 MAIN ST., NEW ROCHELLE, N.Y.
The Greatest Single Source for Clamps and Straps

California Representatives:

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Phone: UNderhill 3-8900

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Phone: MA 6-5256

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Los Angeles: Weingart & Lustig ..... ADams 3-4111
Portland: Pacific Electric Sales ..... BElmont 5-4137

Everstick Anchor Co. 81
Joslyn Pacific Co. in following cities:
Los Angeles ..... LUdlow 7-4251
San Francisco ..... UNderhill 1-7313
Seattle ..... MAin 3-1957
Portland ..... CApitol 3-5127

G & W Electric Specialty Co. 76
Oakland: C. E. Ingalls & Sons ..... OLympic 8-5622
Los Angeles:
R. E. Cunningham & Son ..... MAdison 8-1105
Seattle: W. R. Hendrey Co. ..... MAdison 3-3968
Salt Lake City:
Riter Engineering Co. ..... EMpire 3-7933
Denver: H. C. Guire Co. ..... SPruce 7-2864
Albuquerque: Frank W. Gorman ..... CHapel 7-1596

General Electric Co. 16, 23, 46, 47
San Francisco ..... DOuglas 2-3740
Los Angeles ..... MAdison 5-7381
Phoenix ..... ALpine 8-7724
Denver ..... KEystone 4-7171
Boise 4-3021
Salt Lake City ..... EMpire 4-1891
Portland ..... ATwater 8-0281
Seattle ..... MAin 4-8300

Graybar Electric Co. Inc. 24, 25
San Francisco ..... MArket 1-5131
Los Angeles ..... ANgelus 3-7282
Phoenix ..... ALpine 2-2371
Denver ..... TAbor 5-7111
Boise ..... BOise 3-2594
Butte ..... BUtte 3233
Portland ..... ATlantic 8-5661
Seattle ..... MUtual 2-0122
Salt Lake City ..... ELgin 9-8771
Spokane ..... FAirfax 7-6611
Tacoma ..... MArket 7-0164
San Diego ..... BElmont 3-1361
Tucson ..... MAin 2-6439
Sales offices in following cities: Bakersfield, Fresno, Long Beach, San Jose, Oakland, Oceanside, Sacramento, San Bernardino, Santa Ana, Santa Barbara, Van Nuys, Calif.; Colorado Springs, Colo., and Eugene, Ore.

I-T-E Circuit Breaker Co., BullDog Electric Products Div
(See BullDog listing)

Kuhlman Electric Co. ..... 2nd Cover
Maydwell & Hartzell, Inc., in following cities:
San Francisco ..... VA 6-6900
Los Angeles ..... MAdison 8-7245
Seattle ..... EAst 3-1270
Portland ..... CApitol 8-4173
Phoenix ..... BRidge 5-7644
Spokane ..... MAdison 4-3285
San Diego ..... JU 2-6749
Denver: Sales Engineers ..... AComa 2-4893
Salt Lake City: Sales Engineers ..... HUnter 5-3547

Lapp Insulator Co., Inc. 34, 35
San Francisco: Donald E. Ingalls ..... JUneau 6-0332
Los Angeles: Earl S. Condon & Co. ..... DUnkirk 1-3951
Seattle: Charles F. James ..... MAdison 3-1531
Salt Lake City: Riter Engineering Co. ..... EMpire 3-7933
Butte: R. E. McDonough Co. 2-5447

Line Material Industries 37, 38, 39, 40
San Francisco ..... PLaza 5-8600
Los Angeles ..... RAymond 3-6251
Portland ..... CApitol 2-1981
Seattle ..... ATwater 3-6368
Spokane ..... KEystone 5-2461
Salt Lake City ..... ELgin 5-6257
Phoenix: J. E. Redmond Supply ..... ALpine 4-8471
Boise ..... Phone: 2-5706
Butte ..... Phone: 8340
Denver ..... FL 5-1689 and 1680
Sacramento, Calif. ..... GI 2-6264
Anchorage (Spenard) Alaska ..... FA 2-2649

McGraw-Hill Publishing Co. Inc. 22

National Supply Div. 77
Armco Steel Corp.
San Francisco: Egbert & Assoc. ..... DOuglas 2-2975
Los Angeles: Murphy-Hain ..... ANgelus 8-3521
Denver: Fred E. Staible & Sons ..... TAbor 5-3991
Salt Lake City:
Fred E. Staible & Sons ..... INgersol 6-2461
Seattle: Northwestern Agency Inc. ..... MAin 3-8882
Honolulu:
Hugh L. Bargion Co. ..... Honolulu 6-8846

Ohio Brass Co. 73
San Francisco ..... SUtter 1-5000
Los Angeles ..... MAdison 4-8555
Seattle ..... MAin 2-3842
Denver ..... SKyline 6-7722

Pacific Gas and Electric Co. 6
San Francisco ..... SUtter 1-4211

Petersen Engineering Co. Inc. 74
(Contact factory for nearest dealer)
Santa Clara, Calif. ..... AX 6-7712

Phelps Dodge Copper Products Corp. 28
San Francisco ..... OXford 7-7333
Los Angeles ..... RAymond 3-1311 and PArkview 1-1191
Seattle ..... GLencourt 4-5026
Denver ..... CHerry 4-9291 and CHerry 4-9292
Portland ..... CApitol 6-6117

H. K. Porter Co., Inc., Delta Star Elec. Div. ..... 4th Cover
Belmont, Calif. ..... LYtel 1-4461
Albuquerque: Ralph B. Black ..... ALpine 5-9625
Denver: Electrical Agencies Co. 777-3003
Los Angeles ..... RAymond 3-0393
Phoenix:
Daley Elec. Sales Co. Inc. ..... ALpine 4-4176
Salt Lake City:
Stevens Sales Co. ..... INgersol 7-5489
San Francisco ..... EXbrook 2-2588
Seattle ..... MAin 4-7066
Tucson:
Daley Elec. Sales Co. Inc. ..... MAin 4-6943

Rome Cable Div. of Alcoa 17, 18, 19, 49, 50, 66a, 80
Los Angeles ..... HUntley 2-2475
San Francisco ..... JUno 8-1584
Seattle ..... MAin 4-4040
Salt Lake City ..... ELgin 9-8811
Denver ..... KEystone 4-0533
Phoenix ..... ALpine 4-9248

Royal Electric Corp. 79
Los Angeles: Eckert-Lloyd Co. ..... RIchmond 7-9655
San Francisco: Eckert-Lloyd Co. ..... HEmlock 1-5792
Seattle: Northwestern Agencies ..... MAin 3-8882
Portland: Northwestern Agencies ..... CApitol 7-0434
Phoenix: Wm. Benndorf ..... CRestwood 7-1662
Denver: Strong & Humphrey ..... SH 4-1351

Southern California Edison Co. 8
Los Angeles ..... MAdison 4-7111

Standard Oil Co. of Calif. 20
San Francisco ..... SUtter 1-7700
Los Angeles ..... MAdison 4-2711

Stearns-Roger Mfg. Co. ..... 3rd Cover
Denver ..... AComa 2-8484

Sylvania Electric Products, Inc. 15
San Francisco: Stanley Sales ..... UNderhill 3-8900
Los Angeles: C. A. Peterson Co. ..... CApital 5-2231
Seattle: R. L. Dilworth ..... MAin 2-6888

Victor Specialties, Inc. 81
San Francisco:
Stanley Sales Corp. ..... UNderhill 3-8900
Los Angeles: Hayjax Co. ..... MAdison 8-5256
Phoenix: George W. Hill ..... WH 6-1657
Salt Lake City: John E. Elggren ..... AXtel 5-0472
Denver: Bacon's Elec'l Equip. ..... CH 4-6563

Wagner Electric Corp. 11, 12, 13, 14
South San Francisco ..... PLaza 6-0520
El Segundo, Calif. ..... ORegon 8-7671
Portland ..... CApitol 7-3654
Salt Lake City ..... EMpire 3-5013
Denver ..... CHerry 4-7421
Seattle ..... MAin 2-2342

Westinghouse Electric Corp. 4, 5
San Francisco ..... EXbrook 2-5353
Los Angeles ..... MAdison 6-3881
Denver ..... KEystone 4-8121
Phoenix ..... ALpine 8-8621
Salt Lake City ..... ELgin 5-3413
Seattle ..... MAin 2-0808
Portland ..... ATlantic 8-6311
Spokane ..... FAirfax 8-3371

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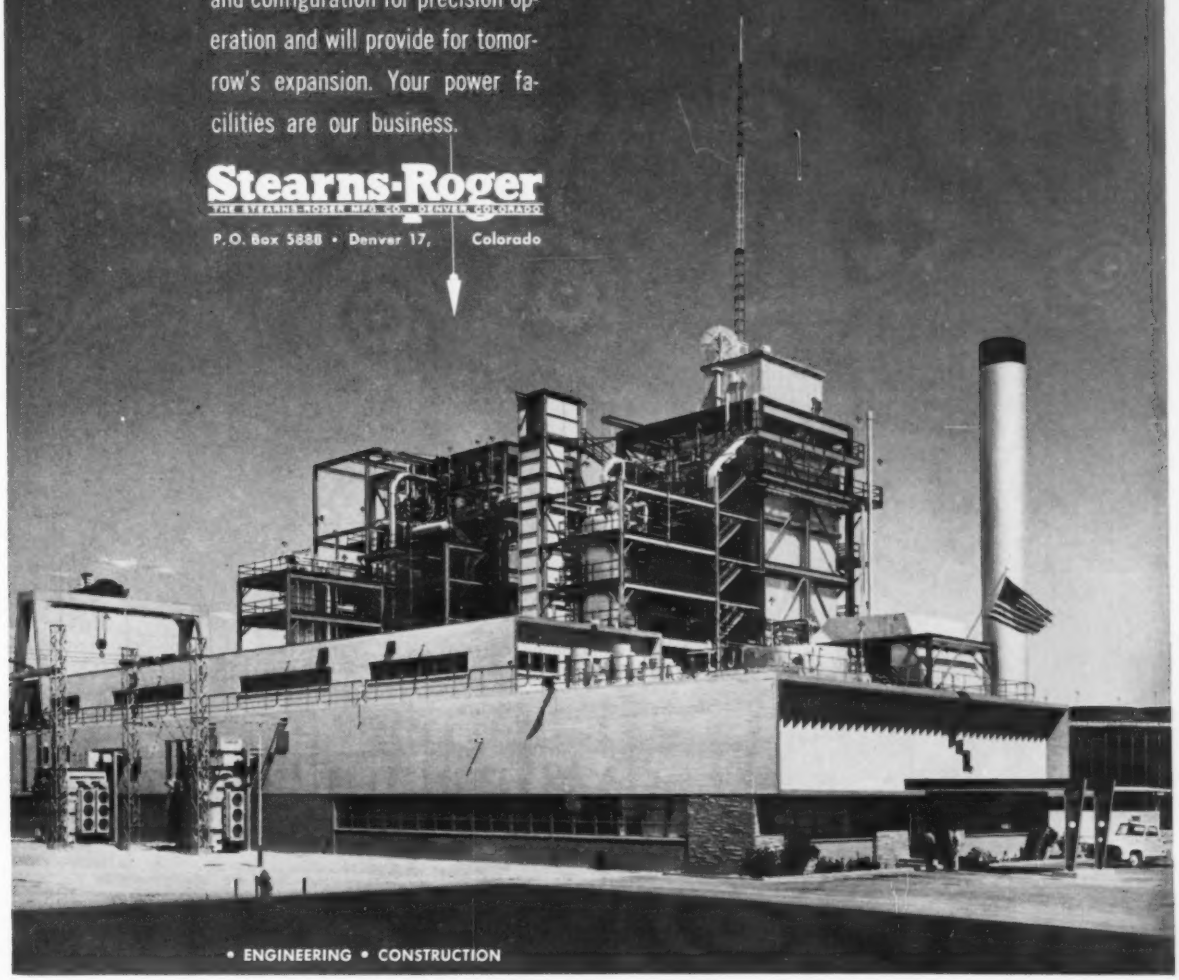

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